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ABSTRACT

A study was conducted to measure the economic impact of Virginia's community colleges on the state's business volume, employment, and income between 1966 and 1974; to analyze the degree of change in these factors since 1966; and to compare findings with state and national trends. The colleges' economic impact was measured using a model based on that devised by Caffrey and Isaacs. The impacts on business volume, employment, and personal income were divided into those related to the presence of the colleges and those related to the new money attracted to the state through the presence of the colleges. Wage and hour data, unemployment, personal and per capita income, non-agricultural income, and personal income by place of work were used as indicators of the changes in the performance of the Virginia economic system since the advent of the community colleges. The study found that the expenditures of the colleges had a significant impact on the state's economy. Between 1966 and 1974, the state general fund appropriation to the community colleges totalled $156,424,000. A business volume of $278,030,000 was generated by total monies related to the colleges and $146,521,000 by new monies. By 1974, a total of 11,318 jobs had been generated due to the presence of the colleges. Finally, $491,648,000 in individual income was generated by community college spending. The study report includes a literture review, conclusions and recommendations. (Author/HB)

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THE ECONOMIC IMPACT OF THE VIRGINIA COMMUNITY COLLEGE SYSTEM 1966 TO 1974

by

Norval L. Wellsfry

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Dissertation submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of
DOCTOR OF EDUCATION

in

Community College Education

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Chapter 1

INTRODUCTION

"But if you think education is expensive--try ignorance." With that simple comment Ann Landers reflected the most commonly held idea about education, that it matters. Community and State support for education is based on the assumption that education is a significant factor in economic and social change. Economic and social advancement are the expected returns of educational investment, both to the individual who pursues it and the region which supports it. But what evidence supporting this assumption is available?

There are two distinct approaches for estimating the return on investment in education, the economic and the social. Schultz and others addressed the personal side of investment in their writings on human capital. Denison identified education as being a major source of economic growth, contributing almost one-quarter to the growth of total national income and over one-third to the increase in national income per person employed (1967:299). The arguments of Schultz, Denison, and others were sophisticated and persuasive. They provided a base for the more pragmatic approach of Caffrey and others who measured the economic impact of educational institutions on communities by modeling the effects of an institution on business volume, employment, and income. The other approach to evaluating the effect of education is to attempt to assess its effect on society. For example, Jencks and Riesman have argued that

higher education is not so much a change agent as a screening agent. Others, including Dewey and Coleman, have argued that education is both a change agent and a stabilizer. Their beliefs have been shared to a greater or lesser extent by the American people, and thus there has been an ever-increasing investment in education. This investment grew tremendously in the sixties, and its size and growth rate has again raised questions about its value.

As Ann Landers has said, education is expensive. Expenditures for education as a percentage of the Gross National Product rose from 3.1% in 1929 to 6.6% in 1965 and to 7.8% in 1974. In 1969 expenditures for education totaled $70,077,228,000. Of this total, 28%, or $24,659,305,000, went to higher education. Of a 1974 Gross National Product of $1,397.4 billion, $108.7 billion went to education. In Virginia the cost of post-secondary education had increased from $35,858,000 in 1963-64 to $206,458,000 in 1973-74, a 475% increase, or 194.04% in constant dollars. A major proportion of this increase resulted from the founding and expansion of the Virginia Community College System,which currently accounts for two-thirds of the students in Virginia colleges. After nine years and a multi-million dollar investment, it is time to investigate the state of the Commonwealth to ascertain what changes have occurred and what the impact of this investment has been.

Purpose

The purpose of this study was twofold. First, it measured the impact of the Virginia Community College System on the Commonwealth's

business volume, employment, and income since 1966. Second, it analyzed the trends of selected economic factors to ascertain the degree of change in those factors since 1966 and compared this change to previously established trends in Virginia and in the United States as a whole.

Two models were used in this study because educational institutions have two kinds of economic impacts: implicit and explicit. The explicit impact of an institution is the immediate economic impact on the financial health of a community by the generation or loss of business volume, employment, and income. Two models have been developed to measure this impact. Caffrey and Isaacs did pioneering work in this field. Subsequently, Sheehan and Serediak refined and simplified Caffrey's and Isaacs' basic model. Both models, modified slightly, were used in conjunction to measure the economic impact of the Virginia Community College System on the economy of Virginia.

The implicit impact of education is difficult to measure. Schultz and the other human capital theorists attempted to show that investments in education have positive quantitative and qualitative rates of return. Human capital theory rests on the proposition that people enhance their capabilities as producers and as consumers by investing in themselves, with education accounting for the largest proportion of this investment. The earliest references on human capital investment date from the seventeenth century and the roots of economic thought, but the basic concept is considerably older.

The second part of this study sought to determine if there

had been any significant economic changes in the economy of Virginia since the initiation of the measured investment in the Virginia Community College System. The study did not pretend to draw exact causal links between the investment, and the change for forces and investments could have generated part or all of the change. In this study, as in its precursers, it was necessary to treat Virginia as a semi-closed economic system. Other limitations of the models will be discussed later.

Historical Perspective

In 1966 there was a clear-cut change in Virginia's attitude toward higher education. The purpose of the Virginia Community College System at its founding was to provide lower division transfer programs, to offer diversified technical curricula leading to associate degrees, to increase the accessibility of vocational and technical education, and to provide courses in general and continuing education for adults.

In part the change in Virginia's attitude toward higher education, especially community college education, was a reflection of national trends. However, as will be explained later, there was a philosophical change also. From 1960 to 1965 two-year college enrollment in the nation increased 90% from 617,000 to 1,173,000. Total college enrollment increased 56% during the same period, from 3,789,000 to 5,921,000. By 1965 two-year institutions accounted for 19.8% of total enrollment, up from 16.3% in 1960. These trends continued through the sixties and into the seventies. Two-year college

enrollments accounted for 32.4% of total higher education enrollment by 1974, increasing 182% over the 1965 figures and 437% over the 1960 figures to an enrollment of 3,311,000. During this same period of time total higher education enrollment increased 72.6% over 1965 levels and 169.3% over 1960 levels to 10,223,000 (Digest of Educational Statistics,1974:225).

Virginia's investment in community colleges was initiated somewhat later than in the nation as a whole. As late as 1959 a legislative study stated that, "It (Virginia) has not adopted a policy of universal college education, nor in our judgment should it do so" (Vaughan, 1971:12). In 1959 in a study for the State Council of Higher Education, S. V. Martorana recognized Virginia's transistion from an agricultural to an industrial economy and recommended a system of community colleges. However, the plan he recommended was never accepted, largely because of opposition from the senior institutions (Vaughan, 1971:14-21). At the time of Martorana's study there was rising pressure from the State's citizenry for broadened access to higher education, both for accessibility and to attract additional industry (Vaughan, 1971:22). In 1960, Virginia trailed the nation in college enrollments. The median school years completed were 9.9 as compared to a national average of 10.6. In 1964 only 25.2% of Virginia's 18 to 21 year olds attended college, as compared to 43.7% for the nation (Vaughan, 1971:1).

By 1964 Joseph Hamrick, Director of Industrial Development and Planning for Virginia, was saying that:

> Economic growth is no longer possible without educational growth which includes expansion of curriculums as well as expansion of educational facilities. We must provide the kind of education that permits our young people to participate in our growing economy to the extent of their abilities (1964:8).

In 1964, there were eleven two year institutions in Virginia; however, they only enrolled 3,314 students, 79% of whom were in transfer programs (Brumbaugh, 1965:47-48).

Albertis S. Harrison, Jr., Virginia's Governor from 1962 to 1966, made industrial growth a campaign issue. He stated that, "industries were interested in coming here (Virginia), but only if we have a trained, skilled labor force waiting for them" (Vaughan, 1971:35). He saw a partnership between education and industrial development, and this need for technical education brought about the break-through to broaden post-secondary education in Virginia.

Mills E. Godwin, Jr., Harrison's successor as governor, saw the community colleges as an evolutionary step for Virginia. He said:

> . . . each one of (Virginia's) more vocal citizens is telling us essentially the same things. He is saying that regardless of his religious or political convictions, the color of his skin, or the size of his bank account, he wants equal opportunity, in every respect, for himself and for his children (Vaughan, 1971:47).

Godwin proposed a statewide system of community colleges that would be a major step in expanding and democratizing higher education.

Some persons felt that the community colleges would broaden and democratize higher education and be an "important milestone on the road to adequate development of Virginia's educational and industrial potential." One person saw the community colleges as

a way of preventing a population drain (and leadership drain) from rural counties (Vaughan, 1971:78-80).

By 1966 four ideas had been accepted in Virginia. First, the State was committed to the concept that the majority of Virginians should have an opportunity for some type of post-high school education. Second, the state had the means to achieve this concept in a system of comprehensive community colleges. Third, these two year programs should be a part of a coordinated system. And fourth, the state recognized the needs and wishes of the people and of labor and indsutry for the means to meet the economic, social, and (to a degree) political aspirations of its citizens (Vaughan, 1971:87). By 1966 Virginia recognized the need for and had the means to provide for a broader base of higher education.

These forces led to a major investment in establishing the Virginia Community College System, and the enrollment growth exceeded the national trends. Between 1965 and 1974 higher education enrollments grew 213% to 192,629 in Virginia. Community college enrollments grew 1,354% to 110,129, or 57.2% of the total enrollment.

Hypotheses

The hypotheses of this study were: (1) that the Virginia Community College System has had a significant impact on the economic health of Virginia as measured by a modified version of the Caffrey/ Isaacs economic impact model and (2) that the economic health of the Commonwealth as measured by selected economic indicators has improved since the advent of the system.

Definitions

The following is a list of definitions of general terms used in this study. Technical terms are defined in Chapter 3 on methodology.

Virginia Community College System (VCCS). The Virginia Community College System is a centralized and unified system of twenty-three community colleges located across Virginia. This system was established in 1966.

Human capital. The acquired and useful abilities of an individual. The investment, non-physical, that a person makes in himself which affects his future earnings and productive capabilities.

Economic impact. The economic consequences or results of a given economic investment by a unit of society.

Limitations of the Study

The following were the limitations of the study:

1. This study, like its precursers, did not consider alternative investments. The Caffrey/Isaacs, Sheehan/Serediak, and most (but not all) human capital investment writers assumed that an investment had already been made or must be made in education and sought to measure the return. Opportunity costs, therefore, are not considered.

2. Virginia is not a closed economic system. But this study, like its precursers, has had to treat the system as semi-closed. Thus, this study has not evaluated the effects of other forces on the economy of the state.

3. This study assumed the general assumptions of the Caffrey model.

4. The study utilized only a limited number of indicators and did not attempt to be definitive or all-inclusive.

Organization of the Study

This study was organized into five chapters.

Chapter 1 was the introduction. It included the reason for undertaking the study, the purpose of the study, the historical perspective of the study, the underlying hypothesis, operational definitions,and limitations.

Chapter 2 is a review of the relevant literature surrounding the study and supporting it.

Chapter 3 contains the methodology of the study.

Chapter 4 contains the results of the study. This chapter is divided into two sections. The first deals with the economic impact of the community colleges' budgets. The second section is concerned with the analysis of the trends of the selected economic indicators.

Chapter 5 includes the conclusions reached from the analysis of the results and the recommendations for further study.

Chapter 2

REVIEW OF LITERATURE

Introduction

The economic contribution of education to both the individual and society in general, the community, state, and nation, has generally been recognized, but difficulties have been encountered in assessing the value of this economic contribution. In this chapter primary attention was given to reviewing, (1) the human investment approach, the major exponent of which is probably Theodore Schultz, and (2) the direct economic impact approach popularized by Caffrey. Since the impact approach provided the basis for the current study, Caffrey will be discussed in detail after a cursory examination of the human investment approach espoused by Schultz and others.

It is widely held that the educational structure makes contributions to economic change. An attempt is made to measure this contribution by examining outputs. There are several ways of measuring outputs. Certain measures attempt to assess the benefits to individuals, while other measures are concerned with the economic benefits that society realizes. Three different approaches have been developed in an attempt to evaluate or measure benefits.

The first approach, the human capital investment approach, attempts to measure contributions in terms of the rates of return earned by individuals for their investment in education. This measure is based on the assumption that this human capital investment

makes for a better producer and consumer.

The second approach measures the direct economic impact of an educational institution on its community. This approach is based on the assumption that a college, as an economic entity, contributes to the financial health of the surrounding community.

The third approach deals with the social impact of education. It is based on the assumption that education has a civilizing effect which makes for a better and more responsible citizenry. This approach is not clearly defined, primarily because this contribution tends to be quite intangible and hence difficult to measure.

Adam Smith, author of the Wealth of Nations, observed that education was a human capital investment:

> Fourthly, of the acquired and useful abilities of all inhabitants or members of a society. The acquisition of such talents, by the maintenance of the acquirer during his eduction, study, or apprenticeship, always costs a real expence (sic), which is a capital fixed and realized, as it were, in his person. Those talents, as they make a part of his fortune, so do they likewise of that of a society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour,and which, though it costs a certain expence, repays that expence with profit. (1937:265-66)

More recently Schultz observed that the improvement in the quality of labor and capital was being left out of labor and capital measurements. He found that schooling was a significant explanatory variable in economic growth (1963:x). Vaizey added the effect of socialization and motivation to the human capital investment (1973:30). Becker analyzed the rate of return on educational investment and recognized the environmental effects

of supply and demand as they related back to the level of return (1964:12). Denison has done excensive work in examining and accounting for economic growth rate changes. He found that the level of education is a significant determinent in analyzing economic growth (1967:78). Machlup has commented on the productive contribution of education and has broadened Schultz's work by adding non-pecuniary returns to educational investment (1970:16).

Extensive investigation has been done on the relationship between education and income. Lassiter found a significant positive correlation between income and education but found that this relationship was subject to modification by other variables (1966:46). The Committee for Economic Development recommended that improved education would result in improvement in both income and employment for low income groups (1965:19-20). Harbison found a high correlation between human resources development and per capita gross national product in countries throughout the world (1964).

Therefore, there was an extensive body of literature that commentedon the relationship between education and economic development. Another way of relating education and economic development, however, is to measure the direct economic impact of an educational institution as an economic entity.

In 1968 the American Council of Education undertook a study to analyze the economic impact of a college or university on a community. After a test study at the Claremont Colleges in California, Caffrey and Isaacs published a model to assess economic impact. Since then this study has been utilized elsewhere, and it

will be discussed later.

The socializing effect of education as a civilizing agent was beyond the scope of this study. However, some relevant comments on social impact are included where appropriate.

Human Capital Investment

The human capital theorists attempted to measure the societal benefit received through the improved quality of the educated. They measured this benefit in economic terms.

Having observed that the productive essences of labor and capital were improving over time but were being left out of labor and capital measurements, Schultz undertook a study based on the precept that,". . . people enhance their capabilities as producers and as consumers by investing in themselves and that schooling is the largest investment in human capital" (1963:x). His study indicated that in ". . . growth, wage structure, and income distribution--changes in the amount of schooling becomes an important explanatory variable. . . . With respect to growth in the U.S., there is now a considerable body of evidence which indicates that schooling and university research are major sources of growth" (1963:52). Schultz saw human resources as having quantitative and qualitative dimensions--the quantitative relating to the number of people working and the hours worked and the qualitative relating to skills and knowledge. He stated that "In so far as expenditures to enhance such capabilities also increase the value of productivity of human effort (labor), they will yield a positive rate of return"

(1963:3). The rate of return is the discount rate at which the lifetime future earnings of an individual are discounted to yield the present value of this future income stream equal to the investment in education. (Another way of putting this is the interest that could be earned on the educational investment over future years to yield future excess income over and above what would be expected future earnings if no educational investments were made.)

Schultz's analysis recognized two costs of education. The first was the cost of educational services provided by the schools. The second was the foregone earnings of students during their education, or opportunity costs. These total costs were compared to the present value of the students future income stream, lifetime earnings, to determine the rate of return of the educational investment.

Schultz's methodology had two principle limitations. First, it did not take into account any social factors, such as family and social environment. In the second place, it ignored the effects of differing income distributions and assumed that private rates of return were the same as national rates of return. These individual variations were important considerations which were not accounted for by Schultz.

Vaizey recognized this limitation in Schultz and went beyond him. Vaizey recognized the effect of family and social environment, neighborhood schools, motivation, and goals. However, he found that

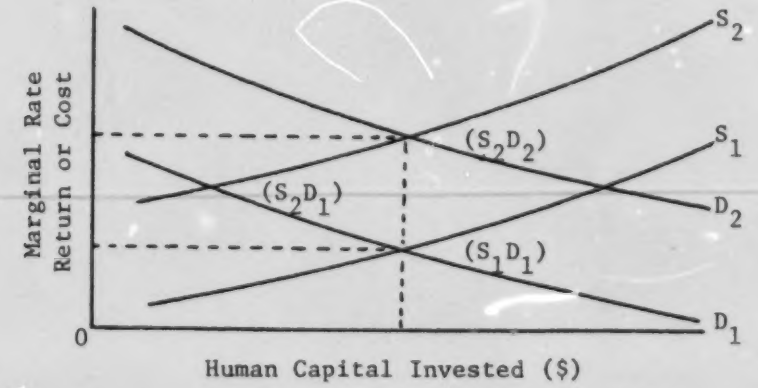
> The links between education and economic growth are mediated, therefore, through a complex pattern with demography and social mobility. But, as economic growth

> occurs, there is a rising and changing demand for skills . . . which is mainly satisfied by the formal education system, because as technology changes, the growing complexity of the economy requires a comples and diverse range of skills at all levels, which cannot be achieved through apprenticeship (1973:30).

Machlup questioned Schultz's numerical results by stating that Schultz took for granted the idea that private rates of return on education corresponded to national income additions and ignored distribution efforts. However, he agreed with the concept that education makes a productive contribution. He found that,". . . educational attainment, measured by years of school completed, is shown to be strongly associated with labor force participation, even after allowance has been made for the influence of certain control variables (age, marital status, color, other income) (1970:16). Machlup went beyond a strictly economic interpretation of returns on investment by including both private and social costs and benefits in his analysis. The costs of education are private (direct cost of education plus foregone income) as well as social (private costs plus direct educational costs for capital and operating expenses and foregone tax revenues). The benefits of educational costs are both pecuniary and non-pecuniary. The pecuniary benefits are earnings (private) and tax revenues (social). The non-pecuniary benefits relate to satisfaction and psychic income, factors which are difficult to measure but which are nonetheless significant. This commentary leads us to the contributions to the human capital concept that have addressed themselves to individual benefits.

Schultz, Vaizey, and to some extent, Machlup addressed

themselves to the returns to society of educational investment. However, other writers concentrated more particularly on individuals. Becker's analysis of human capital and income distribution recognized both the value of the investment in education in terms of its rate of return and its environmental effects. His model utilized both the individual's income, if he made no investment (correcting for both social and motivational differences), and his expected return on his educational investment to yield his lifetime earnings. His model implied that,"The total amount invested in human capital differs among persons because of demand or supply conditions. Those with higher demand or lower supply curves tend to invest more than others" (1964:12). Each person has a negatively inclined demand curve which reflects the marginal benefit and a positively inclined supply curve showing marginal financing costs. The relative position of these curves is different for different persons and different occupations. For any person the optimum investment level is at the intersection of these curves. Different persons could make equal investments and yet earn different returns because their supply or demand curves are different. This point is illustrated below.



In this example, person 1 (S_1D_1) has a lower rate of return than person 2 (S_2D_2), even though their dollar investment is the same. Also, if one could decrease the cost (supply curve) to S_2D_1 for a person, a higher rate of return on a lower investment could be achieved. It is noteworthy that a community college education will do this for an individual (lower the cost and/or raise the rate of return), although the social cost might be equal.

Becker's marginal rate of return depends on a time series of marginal returns and the marginal production cost of investment: "Other things being the same, an increase in the value of time raises the marginal cost of later investments . . . since (they) use more expensive time" (1964:13).

Becker considered his approach to the analysis of human capital as being general in that it implied that earnings and investments were unequally distributed. This was counter to what he described as the egalitarian and elite approaches. The egalitarian approach to income distribution neglected the differences in demand and related differences in supply to man made differences in opportunity. The elite approach neglected supply differences and related demand differences to differences in capacity.

Denison, like Becker, addressed the societal benefit of education through the individual. In his most recent study Denison indicated that education conditions the type of work performed and the proficiency of workers. He found that between 1929 and 1969 "A sharp upward shift in the educational background of the American labor force has upgraded the skills and versatility of labor and

contributed to the rise of national income" (174:43). He suggested that education enhances the individual's skills, often with considerable changes in the work performed.

Earlier Denison's research had indicated a relationship between economic growth and education. He compared growth rates in various countries and concluded that,"In all countries considered here, there has been a gradual upward movement of the distribution of the labor force by amount of formal education" (1967:78). He estimated that the improved quality of labor contributed one-half of one percent to United States growth from 1950 to 1962 (1967:78). It was his opinion that educational differences contributed towards widening the income gaps between the United States and the countries in Northwest Europe:

> Additional education, especially general education, presumably increases versatility, mobility, and awareness of employment opportunities. For this reason, individuals with more education are more likely than those with less education to find employment where, given their abilities, their marginal value products are greatest (1967:80).

These findings helped substantiate Denison's first findings. He had identified the sources of economic growth as Labor, Land, and Capital, following classical economic theories of growth including those set forth by Adam Smith. In his analysis of Labor, as an input factor to growth, Denison divided labor into employment and hours (quality and quantity), education, experience and better utilization of women, and changes in the age-sex composition of the work force (1962:70). He found that education is a critical determinent in the quality of labor because it conditioned the types

of work done and worker efficiency, specifically in terms of skill levels and versatility. He stated that ". . . additional education increases an individuals ability to contribute to production and his earnings" (1962:67).

Machlup also echoed and expanded upon Denison. He cited five factors of economic growth: the use of more labor, the use of physical capital, an improvement in the quality of labor, the use of better machines, and the more efficient allocation and use of labor, material and equipment. Education affects the latter three by improving skills and comprehension, making workers more adaptable to change, increasing workers' ability to move into more productive occupations, training labor in science and technology to invent, develop, adopt, and install better equipment, and helping workers to become more adaptable and mobile.

However, when discussing private returns on educational investment, he indicated that only part of the incremental earnings gains were related to education, while part were due to native ability. For instance, the average college graduate tends to have a higher IQ (120) than a high school graduate (107) (Machlup, 1970:40). Denison used a rule of thumb that forty percent of income differentials are due to non-educational factors (Machlup, 1970:41).

Machlup also addressed the demand for education: "Most people in most countries, developed as well as developing, consider education a 'superior good,' that is, one they want more of as their incomes increase" (1970:61). In fact, education has an income elasticity greater than a unity: "That is, as national income

increases, the demand for education increases in most countries by a larger percentage" (1970:63). This fact is reflected in the United States in that educational expenditures continue to comprise an increasing proportion of the Gross National Product as was mentioned earlier.

Lassiter found a low,positive, but significant, correlation of income and education. He also found that this relation increased between 1949 and 1959 and that it could be altered by significant shifts in the age distribution. When the population was broken down into rural/urban, white/non-white, and male/female distributions, further changes in correlations were observed. This finding led to the implication that unspecified variables besides education (such as ability, determination, socioeconomic background, and family education) are important determinents of income. Lassiter found that:

> The substantial increases in correlation between income and education which took place between 1949 and 1959 are indicative of the increasing importance of formal education as the economy becomes more complex. . . . Increases in the association of income and education are to be expected in the future, perhaps in even greater magnitudes (1966:46).

He discovered, however, that differences in correlation between various race, sex, urban/rural, and regional classes suggested that educational investment would be reevaluated in different terms by each group. Private incentives to invest in education are highly variable because of disparities between groups on rates of return and other factors such as resources, attitudes, and awareness of returns.

The Committee on Economic Development stated that personal

incomes could be improved through additional education. They did a comparison of lifetime incomes and employment for men and women, white and non-white by age group and found that the higher educated groups had higher incomes and lower unemployment. This discovery led them to the conclusions that the contributions of educational programs and training were:

> 1. To provide young people, before they enter the labor force, with the education that will make them trainable and employable in occupations where the demand for labor is rising and their productivity will be highest. . . .
> 2. To prepare people for retraining after they have entered the labor force, if the shift in the demand for labor should require that. . . .
> 3. To provide the specific retraining of workers as changing labor demands require (1965:19-20).

They also said that,"education improves the quality of decisions and of life, making a contribution that is hardly made by any other kind of investment" (1965:20).

When considered in light of the other statements made previously these conclusions tend to overstate the impact of education by failing to recognize the factors other than education that operate in determining income and by ignoring the impact of oversaturation of the market of well educated people.

Harbison provides a summary of the various approaches to human capital measurement. These are the relationship between education expenditures and income or physical capital formation, the residual approach in determining the contribution of education to GNP (Denison), the rate of return on education expenditures, and correlations between school enrollment ratios and GNP. This study related closely to the first approach that Harbison mentions.

However, he commented that, ". . . the concept that human resource development either can or should be analyzed solely in economic terms is misleading" (1964:12). This comment was extremely important, however, the investigation of non-economic factors is beyond this study.

Harbison's study related human resource development and GNP for the United States and other countries (from underdeveloped through advanced economies). His analysis included levels of educational achievement, the number of persons in high level occupations (professional, managerial, and technical, the per capita GNP, and the percentage of the population active in agriculture). A somewhat similar set of variables, as discussed in the next chapter, was utilized in this study.

Based on the general methodologies and results of the review of literature above, a set of economic indicators was selected and analyzed in this study. A more detailed comment on these factors is contained in the next chapter.

The other aspect of the effects of education on an economy is contained in the next section of this chapter which addresses the economic impact of a college on its community.

Economic Impact Model

The function of the economic impact model is to illustrate the economic impact of an educational institution on its community. It is recognized that an educational institution has many kinds of impacts on its community. However, this type of study deals only

with the short-term economic effects.

The germinal work for economic impact studies was funded in 1968 by the Esso Education Foundation. It gave the American Council of Education a grant to assess the impact of a college or university on the economy of its community. Caffrey and Isaacs were the principle investigators and the model developed in the study is generally known as the Caffrey model. The six Claremont Colleges in California, (Claremont Men's, Claremont University Center, Harvey Mudd, Pitzer, Pomona, and Scripps) were selected as a sample and test bed for the study. Early in 1969 a dry run test of a partially completed model was conducted at Oakland University in Rochester, Michigan. The results of this study were published in Estimating the Impact of a College or University on the Local Economy (1971).

The Caffrey and Isaacs study recognized that institutions had many different kinds of economic impacts and that each community presented a unique combination of factors and requirements to be analyzed. Therefore, they provided several models so that researchers would have a choice of factors to evaluate. However, Caffrey's model is limited in that it does not concern itself, except in passing, with costs. The model focuses on benefits, and does not concern itself with alternative investment opportunities.

There are two significant limitations to the Caffrey study. First, the effects considered were current and short range, with no consideration made on the long range effects or manpower development, research contributions, or increased desirability of the area. Secondly, the study did not account for the long range effects on

graduates, especially in relation to their income and productivity.

In the early stages of the study, many impact studies of varying complexity were examined. Caffrey's bibliography lists eighty-seven different studies and articles that attempt to address economic impacts. One advantage of the Caffrey study is its capacity to provide some standardization to impact studies. It also provides a framework and methodology for an institution with limited resources. The model does not provide an in-depth analysis of the economic inter-relationships between a college and its community. Instead, it provides an uncomplicated model using generally readily available data from which users can make generalized conclusions.

The Caffrey study provides the following set of general models, which are in turn broken down into sub models: (The mathematical equations are not included because they are not relevant to this discussion.)

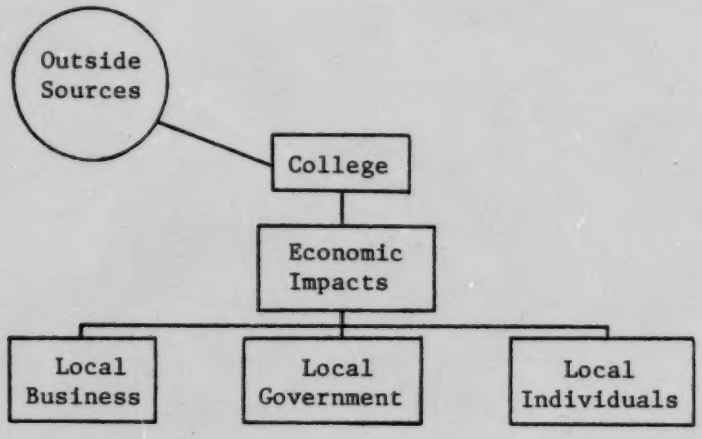
B-1 College related business volume
B-2 Value of local business property committed to college-related business
B-3 Expansion of local bank's credit base resulting from college-related deposits
B-4 Local business volume unrealized because of the existence of college enterprises

G-1 College related revenues received by local governments
G-2 Operating cost of government-provided municipal and and public school services allocable to college related influences
G-3 Value of local governments' properties allocable to college-related portion of services provided
G-4 Real estate taxes foregone through the tax exempt status of the college
G-5 Value of municipal type services self-provided by the college

I-1 Number of local jobs attributable to the presence of the college
I-2 Personal Income of local individuals from college

related jobs and business activities
I-3 Durable goods procured with income for college related jobs and business activities
(Caffrey, 1971:28-33)

The following illustration depicts how the economic impact is determined



The following models were used to determine the impacts:

Local Business = $B_1 + B_2 + B_3 + B_4$

Local Government = $G_1 + G_2 + G_3 + G_4 + G_5$

Local Individuals = $I_1 + I_2 + I_3$

A duplication of the Caffrey study was done by the University of Virginia in 1973. This study, by the Tayloe Murphy Institute, used the basic set of models provided by Caffrey with some modifications. The results of the University of Virginia study were that the college related business volume was $88,376,000, the jobs attributable to the presence of the University was 11,583 (which was 32% of the areas non-agricultural employment), and the individual income related to the college was $84,770,000 (1973:25-40).

Much of the information in this study was generated through

surveys of students, faculty, staff, and area businesses.

The direct expenditures of the University in the community were $63,261,000 in 1972. The remainder of $25,115,000 came from the application of an income multiplier of 1.397 based on the relationship of University related business volume to total employment generated in the area (1973:50).

The income multiplier is an economic concept which measures the multiple impact of an initial income stimulus and it is useful in demonstrating the repercussions of direct stimulation to an economy. The employment multiplier illustrates the additional employment generated by an industry which is externally oriented, but dependent on the population of the area.

There are some important considerations, however, which are appropriate when considering the multiplier. First, the multiplier is less efficient in an economy where there is not significant slack. If resources are not optimally utilized, the employment and income effects of the project are much more difficult to measure. This problem is effectively visualized by a Phillips curve, where any point inside the curve represents inefficient utilization of resources. Second, the multiplier is subject to timing changes. There are lags between stimulations and effects, and it is not known how long the multiplier effect lasts. Third, the multiplier is assumed to remain stable over time, when this is unlikely in reality. Although the timing problem is somewhat alleviated by Caffrey's utilization of short-run impact, the other criticisms are not addressed by him. Brownrigg, who did an economic impact study for a proposed university

in Scotland, used the multiplier, but recognized its inherent limitations and qualified his findings according to the above (1974:111-112).

Brownrigg's study was unique in that it was undertaken to assess the expected impact of a new university, rather than that of an existing one. His study examined the population characteristics and the industrial structure and employment characteristics of the area. He then provided a trend analysis of the internal growth of the area and projected these trends irrespective of the effects of the new university. Finally, he estimated the income and employment impact on the area and projected its secondary growth effects on the local population levels.

Brownrigg's conclusions were that the university would add between £3.93 and £4.88 million to the economy in constant prices. Using an exchange rate of $2.50 per £, this would equate to $9.825 million to $12.2 million. It was estimated that by 1981 £6.5 to £8.0 million would be added to incomes. He also estimated that between 2,580 and 3,420 jobs would be added to the economy, which would grow to 4,300 to 5,800 jobs by 1981. Of this 1981 figure, 2,700 would be directly employed by the university and 1,600 to 3,100 would be employed in secondary growth (1974:82-87).

Brownrigg utilized two techniques in his study that the writer feels are appropriate to this study. First, he analyzed the additional employment which would be seen in the area over and above the actual university employment. This study analyzed the additional employment, as well as business volume and income, that resulted from the community

colleges, as well as the total impact. Caffrey addressed himself to total effects. The second technique that Brownrigg utilized was the trend analysis. He used a trend analysis to predict the status of income and employment in the area if the college was not placed there. He then added the economic impact of the college onto the projected state of the economy. In this study a trend analysis was used to predict where the economy of the State would have been if pre-1966 trends had continued. It then compared the actual status of the selected economic indicators to this predicted level to determine if there had been a change. Brownrigg's study was a predictive study, whereas this study was historical.

In 1973, the University of Utah undertook an economic impact study. This study utilized a methodology, based on the Caffrey model, developed by the University of Calgary: "The Calgary model is a '. . . simple minimum cost methodology for delineating the economic impact of a university on its local economy. . . .' This condensed model is described in the report, University Impact on Local Economy, by Bernard S. Sheehan and Barbara Serediak (1973:2). This study is mentioned because some of the equations utilized in it were used in this study. However, a more in-depth comment on this is contained in the methodology.

There are important considerations that have not been mentioned. The first consideration deals with the multiplier effect. The aforementioned studies do not address the negative effects of taxation on the multiplier, but only deal with the distributional effects of the multiplier. The federal government can expand the

economy in times of unemployment through monetary policy by creating new money. However state and local governments do not have monetary and fiscal policies similar to the federal government since they cannot create money and are generally subject to balanced budgets constitutionally. Therefore, an offsetting negative multiplier results from taxes which flow out of an area that counteract the positive multiplier of the funds which flow into an area. There is an opportunity cost involved in the application of funds to a tax supported institution, however this opportunity cost is ignored in the usual application of the multiplier, especially as applied by Caffrey and others. There is an exchange between localities and state governments of tax dollars. The amount of money appropriated to a college is a return to the locality of tax monies which have been taken out of other localities. There is a distributional effect between communities, when a college exists in one community and draws on tax funds received from another community which must lower its private consumption or investment expenditures. In this case, one community benefits, but at the expense of others. Therefore, when considering the entire state economy, the redistributive effect of the tax monies and the tax appropriations nullify the multiplier and it becomes zero under full employment. A redistributive benefit can also exist. The expenditures (received from taxes) of an educational institution can attract new money into a state or locality over and above local tax contributions. A state can benefit internally if it is able to attract more monies from federal sources than another. This is an example of one area

benefiting from the distributional effect of tax dollars at the expense of others. None of the studies examined to date have looked at the sources of funds and attempted to assess the impact of various sources to account for the redistributive effect of tax monies from various local governmental appropriations as this study did. The trend in current federal funding is in the direction of direct aid to students. Because community colleges broaden the base of educational opportunity, they can expand considerably the state's ability to attract new resources from other areas, especially in the form of student aid and veteran's and social security benefits. Although this factor was not directly addressed by the studies reviewed, it is an important factor and is included in this study.

There was another factor not addressed by the aforementioned studies. Their authors did not consider the potential alternative investments that could have been made with the college's appropriations. Any political decision to make an investment in education has economic, social, and political implications that are different than if the investment had been made in another area. However, the area of alternative choices and their opportunity costs is beyond the scope of this study and was not addressed here. Taxes must necessarily reduce disposable income and thus decrease consumption and investment expenditures which also have a multiplier effect and thus an opportunity cost. Moreover alternative uses (programs) of taxes represent another opportunity cost of using tax monies. These are some of the issues that certainly warrant future research but are beyond the scope of this study.

Summary

This chapter has examined the relevant literature surrounding the human capital concept and the economic impact concept. It has shown how various authors have attempted to address the problem of measuring the various outputs of education, both on an implicit and explicit level.

The next chapter of this study will introduce the methodology to be used in measuring the economic impact of the Virginia Community College System on the State since its establishment in 1966. It will utilize an economic impact model based on the Caffrey model and will do a trend analysis of selected economic factors similar to the analysis done by Brownrigg.

Chapter 3

METHODOLOGY

Introduction

The methodology was designed to test the hypothesis that (1) the Virginia Community College System has had a significant economic impact on Virginia's economy and (2) that Virginia's economic well-being in relationship to the national economy and to its pre-1966 performance had increased to a significant degree subsequent to the advent of the Virginia Community College System. The economic impact was measured in two ways: first, through an analysis of the income and employment impact of the community college expenditures and student aid monies, and second, through an analysis of selected economic indicators.

This chapter is divided into two major sections. The first deals with the direct and induced economic impact of the community colleges. The second section addresses the change in Virginia's economic well-being subsequent to 1966 in terms of the performance of selected economic indicators.

Economic Impact Model

Introduction. The model used in this study to assess economic impact is based on the Caffrey/Isaac model and the Sheehan/Serediak model. In 1971 the American Council on Education funded a research program that resulted in the publication of

Estimating the Impact of a College or University on the Local Economy by John Caffrey and Herbert H. Isaacs. This study was based on the experiences of several colleges throughout the country. The University of Calgary developed a similar but simplified impact model based on the Caffrey model. This model is described in University Impact on Local Economy by Bernard S. Sheehan and Barbara Serediak (Blake, 1973). Several other studies have been made to evaluate the effect of an institution on the local economy. This study is one of the few to attempt to measure the impact of a system on the economy of a state.

Both of the major studies (Caffrey and Sheehan) are based on a cash flow model as illustrated in Figure 3-1. This model is useful in analyzing the impact of the community colleges. Of special importance to Virginia is the side of the model which illustrates external inputs.

The economic impact models were based on several assumptions. First, the community was treated as a semi-closed economic system. Second, it was an estimate of short-run impact only. Third, the model addressed quantitative issues only and did not address qualitative issues such as the tempo of economic activity or economic stability. Last, the models were simple and limited in scope and were not intended to be sophisticated, complex analytical tools.

Given these assumptions, an explanation of the cash flow model is useful. As can be seen in Figure 3-1, money enters the economy through the college, or system, from both internal and external sources. The internal input sources are state appropriations

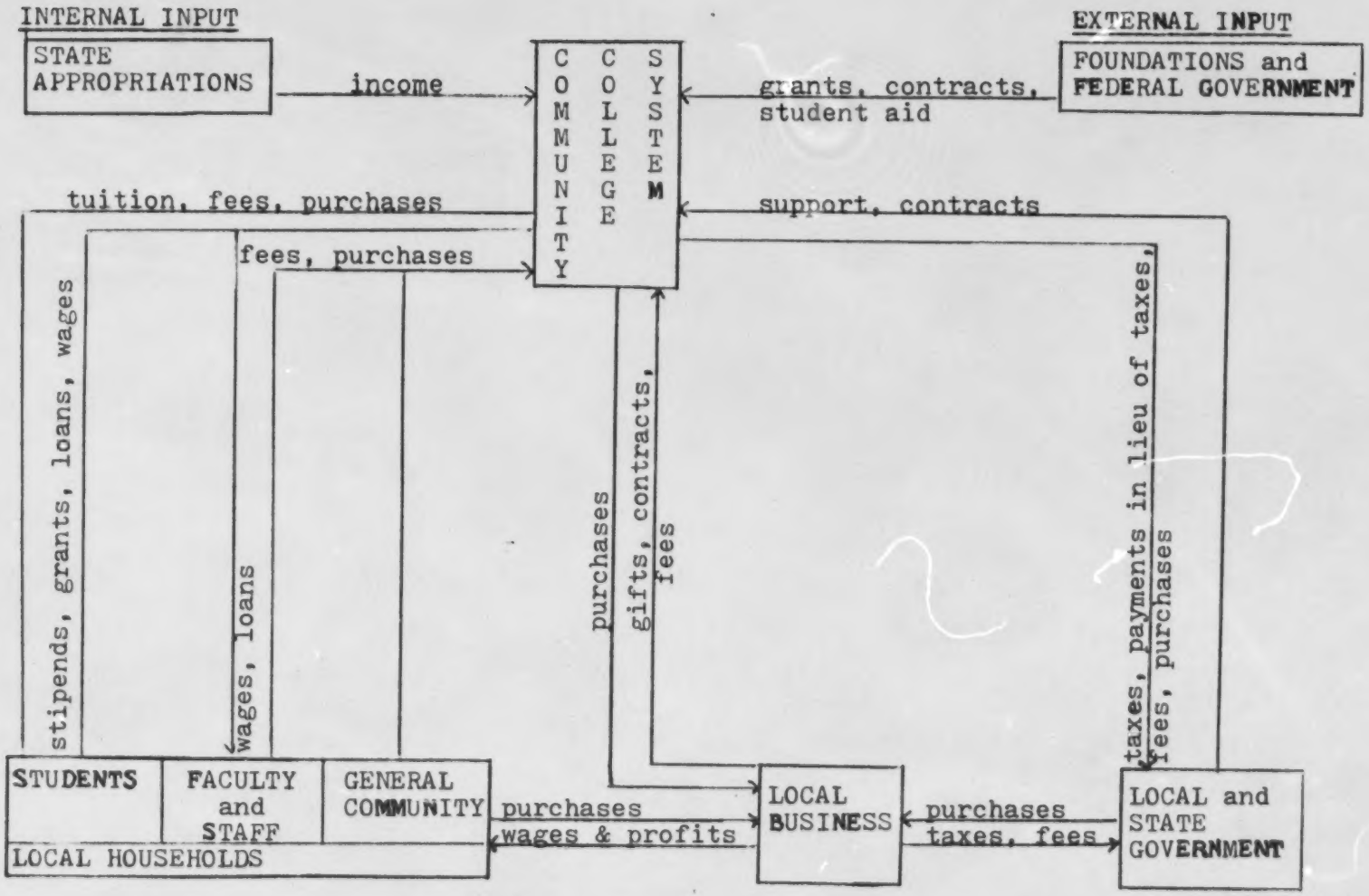


Figure 3-1. Cash Flow Model

and other funds from the state treasury. The external input sources include grants, contracts, and student aid money from non-state sources such as the federal government and private sources. The community college system also receives funds from the community in the form of tuition and fees from students and the general community and contracts and general support from local businesses and local governments.

The college circulates funds by means of expenditures. This circulation occurs through salary payments to college employees, including faculty, staff, and students,and through college purchases of equipment, supplies, and construction from local businesses. It is this circulation of funds through the economy of the state that generates income and employment above the college's immediate impact. This secondary effect is accounted for through the utilization of multipliers.

The models used in this study concentrated on measuring three different effects of expenditures by the community colleges. First, the business volume related to the presence of community colleges. Second, the employment generated by the presence of the community colleges. The personal income generated is the third effect measured. In this study,these three effects were measured in relationship to (1) total expenditures funded by such sources as the in-state general fund revenue appropriations, tuition, federal grants, and private gifts,and (2) the expenditures funded solely by those revenue sources that were attracted to the state by the presence of the system and which may not have been attracted otherwise.

Business Volume. Business volume resulting from the expenditures of the Virginia Community College System, and student aid was determined by using the equations shown in Figure 3-2. These equations were developed by Caffrey/Isaacs and Sheehan/Serediak but have been modified slightly for the unique requirements of this study. Two sets of equations are presented, one to determine the effects of total monies and the other to determine the effect of new monies. Two equations are utilized because of the necessity of considering the redistribution or exchange effect of any tax supported institution.

For two reasons there are two sets of equations used for this calculation, as well as for the calculations for the employment and income impacts. First, it was felt that the impacts measured should be reasonably consistent with the models as originally stated. However, if the in-state monies had been allocated to another type of activity,the economic impact probably would have been different. Therefore, the economic effects of the new monies only are measured to recognize and consider the exchange effect already mentioned.

Several sets of sub-calculations were necessary to derive the information necessary for the equations. These sub-calculations included the determination of the proportion of out of state funds received by the community colleges for the maintenance and operations (M & O) and capital (C) budgets, the determination of the proportion of community college enrollment to total public higher education enrollment in Virginia, and the proportion of veterans' educational benefits and social security student benefits received by community

Business Volume Impact--Total Monies

$$BV = B_s + B_s m_i$$

$$B_s = B_s(M\&O) + B_s(C) + S_{fa}$$

$$B_s(M\&O) = W + hT$$

$$B_s(C) = hC$$

$$S_{fa} = (SS + VA)C$$

Business Volume Impact--New Monies

$$BV_a = B_{sa} + B_{sa} m_i$$

$$B_{sa} = B_s(M\&O)_a + B_s(C)_a$$

$$B_s(M\&O)_a = nB_s(M\&O) + S_{fa}$$

$$B_s(C)_a = nB_s(C)$$

BV = Business Volume Impact--Total Monies

BV_a = Business Volume Impact--New Monies

B_s = Business Volume Generated--Total Monies

B_{sa} = Business Volume Generated--New Monies

$B_s(M\&O)$ = Business Volume Generated by M & O--Total Monies

$B_s(M\&O)_a$ = Business Volume Generated by M & O--New Monies

$B_s(C)$ = Business Volume Generated by Capital--Total Monies

$B_s(C)_a$ = Business Volume Generated by Capital--New Monies

m_i = Income Induced Requirement per Dollar by Final Demand

SS = Student Survivors Monies from Social Security Administration

S_{fa} = Student Financial Aid Monies

VA = Veterans Educational Benefits from Veterans Administration

C = Capital Expenditures

T = Non-Salary Expenditures

W = Net Wages

h = Proportion of In-State Expenditures

n = Non In State Funding Proportion

Figure 3-2. Business Volume Impact Equations

college students. An explanation of the sub-calculations follows.

The determination of the out of state funds proportion of the total expenditures was determined utilizing the revenue sources as expressed in the Biennium Financial Statements of the Virginia Department of Community Colleges. The financial statements indicated the various revenue sources of the total Virginia Community College System revenue. The state general fund appropriation plus student fees and tuition were considered to be in-state funds. These funds conceivably would have been spent within the state whether the community colleges had existed or not. The out of state funds consisted of federal Vocational Education Reimbursements, various federal grants and aid including work study funds, private grants, and other miscellaneous revenue sources. These funds were considered to be out of state funds because their existence was a function of the presence of the community colleges and therefore consisted of new monies attracted to the state. The private grants and other miscellaneous revenue sources could have been interpreted as being new or old money. They did not fit the exact mold of old, or in-state money like the general fund appropriation or tuition, but they could have been considered as such since they did not physically come from out of state. The amount of private grants was nominal, and non-existent in half of the years studied. However, since this money was given directly to the community colleges, it was considered as new money. The miscellaneous funds are not quite as clear, since these funds come from surplus property sales, insurance recoveries, auxiliary enterprises, and state student aid. However, these fund

sources are a direct function of the presence of the community colleges and do come from several unrelated sources. Some would argue that these funds are a product of the investment rather than a sourse of funds. Others argue that these funds are an investment because they support ancillary events. It was decided to include these funds as new monies in this study. Because these funds tend to be a small percentage of the total new monies, any error that might exist will be small.

The proportions determined in the above calculations were applied against the expenditures of the M & O budget to yield the expenditures of the Virginia Community College System which were attributable to out of state or new monies.

A calculation similar to the one above was used to determine the proportion of capital expenditures attributable to out of state funds. The sources of capital funding for the community colleges are local governments, the state government, and the federal government. The proportion that each of these sources contributed to the total capital budget was determined. Local government and state government contributions were included as in-state funds. The federal government contribution was considered to be an out of state source of funds based on the assumption that these federal funds were attracted into the state for community college construction and might not have been attracted without the community colleges.

The funds contributed to the state for social security survivors' benefits to students and veterans' educational benefits were not separated for community college and non-community college

students. Therefore, the total higher education enrollment and total community college enrollment for each year from 1966 to 1974 was determined. Community college enrollment was then divided by total higher education enrollment to determine the proportion of students enrolled in community colleges. This proportion was then used to estimate the amount of funds going to community college students, as will be explained later.

The amount of veteran's educational benefits paid to community college students was not readily available for the years covered by this study. However, the total veteran's educational benefits paid was available. Therefore, this amount was multiplied by the proportion of community college students, as determined above, to get an estimate of the total veterans' educational benefits received by community college students. This estimate is considered to be low and conservative because the proportion of veterans attending community colleges is probably higher than the proportion of community college students in higher education. However, it is considered more appropriate to have a conservative error than a liberal error. Therefore, the benefits received amount included in this calculation will probably be understated. This same reasoning is also valid for the social security student survivors benefits, although to a lesser extent.

The amount of benefits received by student survivors in Virginia was not readily available. Therefore, several estimates were necessary to determine this amount. The Social Security Administration makes student payments to survivors who are eighteen

to twenty-one years of age. A person over the age of eighteen must be a student to qualify for continued survivor benefits. The amount of survivors' payments made in the United States and Virginia is readily available. It is also possible to determine the amount of childrens' benefits and student benefits paid in the United States. The amount of students' payments in Virginia can be estimated using the following calculations. First, the amount of child payments as a percentage of total survivor payments for the United States was determined. The percentage was then applied to the Virginia survivor payments to get an estimate of the children's payments in Virginia. This calculation is based on the assumption that an equivalent ratio of children beneficiaries to survivor beneficiaries exists in Virginia as compared to the United States as a whole. Second, the percentage of student payments to total child payments for the United States was determined and this ratio was applied against the estimated Virginia children's payments determined previously to determine the Virginia student payments. This estimate was then multiplied by the proportion of community college students to get an estimate of the student payments made to community college students from the Social Security Administration. This figure is only an estimate of the amount paid; however, it is most likely an underestimate.

The amounts estimated by the above calculations are expressed in calendar year amounts. To convert them to fiscal year amounts so that they are consistent with the other data utilized in the impact calculations, the calendar year amounts were divided by two

with each half distributed to the fiscal years which coincided with the calendar years. For example, the 1967 amount was divided between fiscal years 1966-67 and 1967-68.

The amounts determined were utilized in the equations in Figure 3-2 to determine the impact of the VCCS on the state's business volume. Further explanation of the other factors utilized in the equations follow.

There are three factors in the business volume impact that require further explanation. They are the h, n, and m_i factors. The h factor is the proportion of total spending that is expended within the state. Since not all spending is done with in-state vendors, the total spending is modified by the h factor to get a more accurate measure of the impact of the spending on business volume. The n factor is the proportion of out of state funding as determined from the revenue information. An explanation and justification of this factor was made earlier. The m_i factor is an application of the multiplier principle. This m_i factor represents the additional value of local industrial and commercial output when household income and expenditures are recycled. This factor is added to the total business volume generated to include household effects on the level of business output.

The next factor to be considered is the impact of the community colleges on the employment of the state.

Employment Impact. The employment impact is a measure of the impact of the community colleges on the employment of the state.

This impact was also measured in terms of total and new monies expended. The equations used to determine this impact are found in Figure 3-3. As mentioned previously, this set of equations also measures the employment effects of both total and new monies.

The first step in determining the employment impact was the calculation of the full-time equivalent faculty and staff. The number of full-time faculty and staff was obtained from the Virginia Department of Community Colleges. The number of part-time faculty and staff was also obtained. The part-time staff was converted to full-time staff by dividing the number of part-time staff by two. This calculation was based on the assumptions that the average full-time staff person worked forty hours per week and the average part-time staff person worked twenty hours per week. The full-time equivalent faculty was determined by dividing the number of part-time faculty by five. This calculation was based on the assumption that the average full-time faculty member taught five courses of three credits each and the average part-time faculty member taught one course of three credits.

The employment requirements factor, p, is an estimate of the marginal change in local employment due to the average money spent when the direct and indirect production requirements and induced income requirements on local production are taken into account. Technically, it is the slope of the linear-regression line relating employment to production. Caffrey stated that the coefficient ranged from .00007 to .00009 man years of employment per dollar of local business volume related to the college. A coefficient of .00009

Employment Impact--Total Monies

$$J = E = pB_s$$

Employment Impact--New Monies

$$J_a = nE + pB_{sa}$$

Income Impact--Total Monies

$$I = \alpha W + \Omega(B_s - W)$$

Income Impact--New Monies

$$I_a = \alpha W_a + \Omega(B_{sa} - W_a)$$

$$W_a = nW$$

B_s = Business Volume Generated--Total Monies

B_{sa} = Business Volume Generated--New Monies

I = Income Impact--Total Monies

I_a = Income Impact--New Monies

J = Employment Impact--Total Monies

J_a = Employment Impact--New Monies

W = Net Wages--Total Monies

W_a = Net Wages-New Monies

E = Full-time Equivalent Faculty and Staff

p = Employment Requirements Coefficient

n = Non in State Funding Proportion

α = Initial Income Multiplier

Ω = Internal Multiplier

Figure 3-3. Employment and Income Impact Equations

was used in this study.

The employment impact of new monies was calculated by multiplying the full-time equivalent employment by the proportion of out of state funds and adding this to the product of the employment requirements coefficient times the new money business volume.

The last impact factor analyzed is the income impact.

Income Impact. The income impact measures the impact of the Virginia Community College System on the individual income of the state. As with the previous impacts, the income impact was also determined for total and new monies. The income impact was also measured using two income multipliers to give a range of impact. The equations for measuring the income impact are included in Figure 3-3.

The two factors utilized in these equations which have not been previously mentioned are the α and Ω multipliers. The multiplier is further distinguished as either a Type I or a Type II multiplier.

The alpha (α) multiplier is the initial income multiplier. The formula for the income impact is derived from the Sheehan/Serediak model of the University of Calgary. The values used for both the initial income multiplier and the internal multiplier were obtained from Sharma (1973). Sharma's calculations yielded a Type I alpha multiplier of 1.04565 for educational services, and a Type II alpha multiplier of 1.42613. These multipliers were applied uniformly to all years studied.

The omega (Ω) multiplier is the internal multiplier which measures the secondary effect. Sharma calculated this factor to be 1.64941 for educational services (1973).

The Type I multiplier measures the income effect of the direct and indirect effects on total income. The Type II multiplier measures the direct, indirect, and induced effects. Using both Type I and Type II income multipliers permits a range of income effects to be established. Therefore, the actual effect will probably lie somewhere in this range.

The second part of the methodology utilized in this study analyzed the change in selected economic indicators since 1966 as compared to previously established trends within the state and as compared to national trends.

Analysis of Trends in Selected Economic Indicators

Introduction. Economic indicators were selected to evaluate the relative changes in the performance of the Virginia economic system since the advent of the community college system. The performance of these indicators was compared with, (1) past trends and (2) national trends. These indicators are commonly used measures of economic performance. The indicators used in this study were:

Average weekly and hourly earnings and average weekly hours— production workers manufacturing

Unemployment rate

Personal income

Per capita personal income

Employment in the non-agricultural establishment

Personal income by place of work--
+ wage and salary income
+ other labor income
+ proprietors' income

The economic factor analysis examined the performance of the selected indicators using national trends and state trends prior to 1966 as the points of reference. These trends were then compared to trends established after 1966. The national trends have been used as the baseline for evaluating the relative progress of the Virginia economy.

The analysis consisted of two parts. First, the performance of selected indicators was extracted from appropriate statistical compilations such as the Survey of Current Business, the Virginia Economic Indicators, the Handbook of Labor Statistics, and the Statistical Abstract of the United States. After the data had been compiled, the results were graphed so that the rates of change in the various factors could be analyzed. For this purpose, semi-log graph paper was used. The pre-1966 trends were determined by fitting a trend line to the points plotted on the graphs. A similar procedure was followed for the post-1966 data. Comparisons were then made between the pre-1966 and post-1966 data for the state and the national data.

The base period selected for the study extended from about 1950 to 1966. Not all factors start at the same base year because of data accessibility or graphing limitations. However, for all the indicators the base period is considered to be sufficiently long to establish a definite trend. It was also not considered

necessary to extend the data back beyond 1950 because of the changes in the economy since that time and because of the distortions of World War II.

The trends in the selected indicators from the base period were extended into the period from 1966 to 1974. The purpose of this projection was to support the hypothesis that there had been a change in Virginia's economic growth rate from trends established prior to 1966. If the hypothesis were true, the growth rate after 1966 would have been greater than that prior to 1966 and should also have been greater than the national growth rate.

All dollar figures used in the study were expressed as current dollars. It was not considered necessary to convert the current dollars to constant (real) dollars using a deflator such as the GNP Implicit Price Deflator because the analysis was concerned with rates of change. Deflation of the dollar figures would not have changed the comparison of the rates of change.

Reasons for factor selection. As has been stated, the sources of economic growth are labor, land, and capital. The factors which have been selected for this study are used as economic indicators by the Joint Economic Committee and the Council of Economic Advisors and the Virginia Employment Commission. These agencies use more indicators than the ones used in this study. The factors selected for the study were selected because it was felt they gave an accurate accounting of the behavior of the economy.

The average work week of production workers is a leading

indicator, and another significant indicator according to the Virginia Employment Commission is the average weekly and hourly earnings of production workers. These figures are on a "gross" basis and reflect not only changes in basic hourly and incentive rates, but also such variable factors as premium pay for overtime and late-shift work and changes in the output of workers paid on an incentive basis. They also reflect the changing employment of workers as between relatively high-paid and low-paid work and relatively high-wage and low-wage industries. Since these are reflections on the quality of the labor force, they were included as relevant indicators.

The unemployment rate is classified as a roughly coincident indicator by the Virginia Employment Commission. As such it reflects the general condition of the economy. It was included in this study as both a reflector of the state of the economy and an indicator of the growing industrialization of the economy. It was felt that if the unemployment rate approached that of the national average, Virginia's economy would be reflecting a composition similar to the national economy.

Personal income and per capita personal income are listed by the Joint Economic Committee as economic indicators. They were included in this study because they reflected the income received by individuals in Virginia and, therefore, the economic health of the state.

Employment in the non-agricultural establishment is another roughly coincident indicator of the Virginia Employment Commission. It was selected because it reflected both increasing industrial

employment and a shift from an agricultural to an industrial economy.

Personal income by place of work was selected to support the results of the data from personal and per capita income and to give additional explanation of them.

It was felt that these factors gave a reasonable estimate of the behavior of the economy. Although other factors could have been selected, this study was only observing a sample of factors and was not attempting to draw any causal relationships.

Definitions of Selected Factors. The following are the generally accepted definitions of the factors selected for this study.

Wages and salaries are the monetary remuneration of employees, inclusive of executive compensation, commissions, tips, and bonuses, and payments in kind, which represent income to the recipients.

Other labor income comprises employer contributions to private pension, health, unemployment, and welfare funds; compensation for injuries; directors fees; pay of the military reserve; and a few other minor items.

Proprietors' income measures the monetary earnings and income in kind of sole proprietorships, partnerships, and producers' cooperatives from their current business operations, other than supplementary income of individuals derived from renting property.

Personal income is the current income received by persons from all sources, inclusive of transfers from government and business,

but exclusive of transfers among persons. It is the sum of wage and salary disbursements, other labor income, proprietors' income, rental income of persons,dividends, personal interest income, and transfer payments less personal distributions for social insurance.

Per capita income is the total personal income divided by the current population estimate.

The unemployment rate is the percentage of the civilian labor force defined as unemployed. Unemployed persons comprise, (a) those who did not work at all during the survey week, who made specific efforts to find a job within the past four weeks, and who were available for work during the survey week, and (b) those who did not work at all,were available for work, and were waiting to be called back from layoff or were waiting to report to a new wage and salary job within thirty days.

Average weekly hours for production workers in manufacturing are computed by dividing the sum of production worker man-hours by the number of production workers.

Average hourly earnings are obtained by dividing the reported production worker payroll by the total production worker man-hours.

Average weekly earnings are computed by multiplying average hourly earnings by average weekly hours. These figures should not be confused with wage rates nor do they represent the total labor cost per man-hour for the employer.

Non-agricultural employment is the number of persons employed in the non-agricultural industries of the civilian labor force. These industries are mining, contract construction, manufacturing,

wholesale/retail trade, finance, insurance and real estate, transportation, communications and utilities, services, government, and other industries.

Summary

This chapter has discussed the methodology used in this study. It described the economic impact model as modified from the Caffrey and Sheehan models. It also described the technique used to analyze the selected economic indicators, gave the reasons for the factor selections, and defined the factors utilized in the study.

The next chapter presents the results of the data collected for this study.

Chapter 4

RESULTS

This chapter contains the results of the analysis to determine the economic impact of the Virginia Community College System. It is divided into two main parts. Part one includes the results of the economic impact model. Part two contains the data on the trends of the selected economic indicators.

ECONOMIC IMPACT MODEL

The purpose of the economic impact model was to ascertain the economic impact of the Virginia Community College System on the economy of the Commonwealth of Virginia between 1966 and 1974. The impact was measured in terms of the effect of the system on income, business volume,and employment in the state. The precursor to this study, Caffrey's model, did not account for the alternative uses of community money. An underlying assumption of the Caffrey model was that educational institutions created income and employment that otherwise would not have been created. This assumption is difficult to test. In the interest of conservatism and because the assumption may not be fully warranted in this study, the effects of two different types of investment monies on the income and employment of a community were investigated. One was the investment provided by the state on the community, and the other was the investment attracted from outside the state, which was "new money." The new money impact resulted

from funds attracted into the state by the presence of the Community College System which might not have been attracted otherwise.

Impact of Maintenance and Operations (M & O) Monies

Revenue Sources. The first factor which was analyzed in determining the impact was the sources of funds, or investment, for the Virginia Community College System. The financial statements of the Virginia Department of Community Colleges were analyzed to determine these sources. The results of this analysis are expressed in Tables I and II. The funds sources were subdivided into in-state and out-of-state sources("new money"). State General Fund appropriations and students' tuition and fees provide the in-state sources. Vocational Education Reimbursements (federal), federal aid (including work study funds), private grants, and other miscellaneous revenue sources comprise the out-of-state funds. The distinguishing characteristic of the out-of-state funds is that they are monies attracted into the state which might otherwise not have been attracted if the community colleges had not been there.

New or out-of-state funds had provided for as much as 23.4% in the first three years of the system and now provide for as little as 11%. The proportion of revenues coming from within the state ranged from a low of 76.6% in the 1966-67 fiscal year to 93.5% in the 1969-70 year. Since 1969-70, the state contribution from general fund revenues and tuition revenues has averaged 88.4% of the total annual budget. However, any error which occurs because of this factor tends to be conservative and the out of state revenue

TABLE I

CURRENT IN-STATE FUND SOURCES

Fiscal Year	General Fund Appropriation	Tuition and Fees	Total In-State Funds	Percent of Total Revenues
1966-67	$ 3,287,897	$ 556,978	$ 3,844,875	76.6%
1967-68	8,310,477	1,159,630	9,470,107	77.5
1968-69	12,182,151	1,923,318	14,105,469	76.4
1969-70	16,167,697	2,680,460	18,848,157	93.5
1970-71	18,112,935	4,355,190	22,468,125	90.0
1971-72	23,040,497	5,496,263	28.536,769	88.8
1972-73	34,441,105	8,037,514	42,478,619	88.7
1973-74	40,883,150	9,843,539	50,726,689	86.1

Source: VDCC Biennium Financial Statements, 1966-67 to 1973-74

TABLE II

CURRENT OUT-OF-STATE FUND SOURCES

Fiscal Year	Vocational Education Reimbursements	Federal Aid	Private Grants	Other Misc. Revenues	Total	Percent of Total Revenues
1966-67	$ 661,610	$ 44,633	$ 500	$ 464,533	$1,171,276	23.4%
1967-68	882,769	149,739	2,628	1,714,104	2,749.240	22.5
1968-69	82,769	282,339	905,000	3,076,339	4,346,447	23.6
1969-70	1,372,370	403,698	95,000	237,282	2,108,350	10.4
1970-71	1,725,530	614,451		150,153	2,490,134	10.0
1971-72	1,906,548	1,488,677		190,142	3,585,367	11.2
1972-73	1,486,615	3,836,880		476,258	5,799,754	12.1
1973-74	2,225,598	4,115,138		643,342	6,984,078	11.8

Source: VDCC Biennium Financial Statements, 1966-67 to 1973-74

percentage is generally understated.

The percentages utilized in these tables reflect the category as a percentage of the total revenues reported that year. Therefore, in some years the percentages did not add up to 100%. This discrepancy was caused by fund transfers within the M & O budget and from or to the capital budget. In all years there are fund transfers into and out of the current operating funds which came from several sources. Therefore, fund transfers were not utilized when determining the proportions of funds coming from within or outside the state.

An examination of the out-of-state data indicated that the Vocational Education Reimbursement and federal showed a continuing upward trend. Private grants had been nonexistent since 1969-70. This fact is explained by a prohibition against any collecting of private funds by Virginia Community College System. The majority of the funds included in this classification, $1,000,000 of the $1,003,128, were from the Beazley Foundation of Portsmouth, Virginia for the operation of what is currently the Frederick Campus of Tidewater Community College. Formerly the Frederick Campus had been the site of a private college, Frederick College, and it was donated to the state by the Foundation.

Expenditures. The expenditures of the M & O budget are reflected in Table III. All figures were derived from the Virginia Department of Community Colleges Biennium Financial Statements and VDCC unpublished data. The Virginia Department of Community Colleges does not record salaries as a separate figure when reporting expendi-

TABLE III

PAYROLL AND NON-SALARY EXPENDITURES

Fiscal Year	Gross Deductions	Gross Payroll	Net Payroll	Non-Salary Expenditures	Total M & O Expenditures
1966-67	$ [illegible]59,336	$ 2,320,213	$ 1,860,87[illegible]	$ 2,015,834	$ 4,336,047
1967-68	1,229,571	6,000,403	4,770,832	5,198,453	11,198,856
1968-69	2,282,687	10,521,981	8,239,294	7,188,681	17,710,662
1969-70	3,116,409	14,642,643	11,526,234	4,958,308	19,600,951
1970-71	3,741,219	18,539,508	14,798,289	5,805,570	24,345,078
1971-72	4,992,253	24,613,712	19,621,459	6,445,090	31,058,802
1972-73	6,922,978	32,476,194	25,553,216	10,399,846	42,876,040
1973-74	9,082,558	41,016,778	31,934,220	14,454,296	55,471,074
Totals	$31,827,011	$150,131,432	$118,304,421	$56,466,078	$206,597,510

Source: VDCC Biennium Financial Statements, 1966-67 to 1973-74

tures. It was therefore necessary to derive the data from tax reporting forms. Because of this fact, the gross payroll was understated and the non-salary expenditures were overstated. The tax reports utilized included only the FICA taxable wages, which, because they have an upper limit, are sometimes less than total taxable wages. However, the error realized by this factor will tend to be conservative, and the ultimate impact will be understated rather than overstated.

Student Financial Aid/Income. In both the Caffrey model and the Sheehan model student expenditures were an important variable in determining the business volume generated by the college. However, since the community college student is a commuter student who normally resides in the area, any of his expenditures would probably be made whether he were a student or not. Therefore, this factor was removed from the equations. However, community college students, because of their student status, can attract additional funds into an area. One way is through financial aid in the form of work study monies which has already been included as a revenue and expenditure. However, there are other funds attracted into the state which are not reported in the financial statements. These include Basic Educational Opportunity Grants, Supplemental Educational Opportunity Grants, National Direct Student Loans, and Guaranteed Student Loans under federal programs and the College Scholarship Assistance Program under state programs. Other funds included state and federal nursing scholarships and the Law Enforcement Education Program, but these

programs are very limited. A detailed breakdown of these figures was not available to the writer at the time this study was completed. However, an estimate of $3,041,358 for fiscal year 1974-75 was made by Sam Mills of the Virginia Department of Community Colleges. These figures were not included in this analysis. However, two other important sources of student aid could be estimated and were included. These were survivors' benefits to students under OASDHI (Social Security) and Veterans' Educational Benefits.

Community College Enrollment. The first step in this analysis was to determine what proportion community college enrollment made up of the total higher education enrollment. The results of this analysis were included in Table IV. As can be seen, community college enrollment was a rapidly increasing proportion of total enrollment, increasing from 10.2% in 1966 to 57.2% in 1974. These proportions were used to determine the amount received by community college students from the Social Security and Veterans' Administration.

Veterans' Benefits. The amount paid in veterans' educational benefits is reported in Table V. The trend is dramatically upward from $612,000 in 1965 to $62,066,000 in 1974. The most dramatic jump occurred between 1969 and 1970, when payments increased from $7,906,000 to $19,857,000. This increase can be explained in large part by the influx of the first stream of Vietnam veterans.

Social Security Benefits. The social security benefits that accrued to Virginia survivor students had to be estimated. The only

TABLE IV

HIGHER EDUCATION ENROLLMENT IN VIRGINIA, 1965 - 1974

Year	Public Higher Education Enrollment	Public Community College Enrollment	Community College Enrollment as Percentage of Higher Educ. Enrollment
1965	61,531	-0-	-0-
1966	74,083	7,573	10.2
1967	89,446	12,370	13.8
1968	99,299	22,797	23.0
1969	108,776	30,341	27.9
1970	120,910	39,765	32.9
1971	134,987	52,143	38.6
1972	147,586	66,199	44.8
1973	165,000	83,347	50.5
1974	192,629(E)	110,129	57.2

Source: Digest of Educational Statistics and VCCS 1974-75 Annual Report

TABLE V

VETERANS BENEFITS RECEIVED IN VIRGINIA AND THE UNITED STATES FROM 1965 TO 1974

Year	United States		Virginia	
	Total ($ millions)	Education ($ millions)	Total ($ thousands)	Education ($ thousands)
1965	6,967	37	136,816	612
1966	7,325	31	142,408	587
1967	8,003	287	152,375	3,155
1968	8,425	447	156,368	5,135
1969	9,026	661	173,958	7,906
1970	10,122	991	203,699	19,857
1971	11,461	1,592	233,499	30,533
1972	12,580	1,889	254,197	30,085
1973	13,917	2,613	296,551	49,501
1974	14,981	3,121	328,085	62,066

Source: Statistical Abstract of the United States

way that a child can continue to receive social security survivor benefits after the age of eighteen is to become a student. Since the data was not readily available, the estimate had to be determined through several steps. The first step was to determine the total survivors' benefits paid in the United States and Virginia. Secondly, the proportion of payments to children of survivors payments in the United States was determined. This proportion was then applied to Virginia survivor payments to determine the estimated payments to children in Virginia. The result of this analysis is presented in Table VI. The figures for 1966 were not available because of a change in the reporting method of that year which lumped old age and survivors' benefits together.

The next aspect of the analysis was a calculation of student benefits as a proportion of children's benefits. This percentage was then applied to the Virginia children's benefits in Table VI to derive the Virginia student benefits. This result is included in Table VII. As can be seen, Virginia Student benefits (for eighteen to twenty-one year olds) had increased from $690,000 in 1965 to $11,690,000 in 1974. Although not as dramatic as the increase in veterans' benefits, it is nonetheless a significant increase.

Calculated Student Aid/Income. Tables VIII and IX contain the calculation of federal student aid monies from social security and veterans' benefits. Column 1 comes from Table VII, Column 2 comes from Table V. Column 4 comes from Table IV. Column 5 is the

TABLE VI

SOCIAL SECURITY (OASDHI) BENEFITS IN CURRENT PAYMENT STATUS AND BENEFIT PAYMENTS TO SURVIVORS FOR THE UNITED STATES AND VIRGINIA

Year	Survivors Payments ($ millions)		Child Payments for U.S. ($ millions)	Child Payments as Percentage of U.S. Survivors Payments	Estimated Virginia Child Payments ($ millions)
	United States	Virginia			
1965	3,511.4	68.0	159	4.53	3.08
1966	NA	NA	175	--	--
1967	4,668.9	90.8	187	4.01	3.64
1968	5,273.2	103.5	224	4.25	4.40
1969	6,414.6	125.2	234	3.65	4.57
1970	7,066.3	137.9	280	3.96	5.46
1971	8,294.6	164.2	320	3.86	6.33
1972	9,131.0	181.0	403	4.41	7.99
1973	11,173.7	223.0	421	3.77	8.40
1974	13,213.1	262.7	480	3.63	9.54

Source: Statistical Abstract of the United States

TABLE VII

CALCULATION OF ESTIMATED VIRGINIA STUDENT BENEFITS FROM SOCIAL SECURITY

Year	United States			Virginia	
	Children's Benefits ($ millions)	Student Benefits ($ millions)	Student as Percent of Child[1]	Children's Benefits ($ millions)[2]	Estimated Student Benefits ($ millions)[3]
	(1)	(2)	(3)	(4)	(5)
1965	159	14	8.8	3.08	.27
1966	175	NA	--	--	--
1967	187	NA	--	3.64	--
1968	224	35	15.6	4.40	.69
1969	234	36	15.4	4.57	.70
1970	280	45	16.1	5.46	.88
1971	320	53	16.6	6.33	1.05
1972	403	70	17.4	7.99	1.39
1973	421	72	17.1	8.40	1.44
1974	480	85	17.7	9.54	1.69

Source: Statistical Abstract of the United States

[1]Column (2) divided by Column (1)

[2]From fifth column, Table VI

[3]Column (3) times Column (4)

TABLE VIII

CALCULATION OF SUPPLEMENTAL FEDERAL STUDENT AID MONIES FOR VIRGINIA

Year	OASDHI Student Benefits ($ thousands) ss	Veterans Educational Benefits ($ thousands) VA	Total Federal Supplemental Benefits ($ thousands)	Community College Enrollment Percentage c	VCCS Federal Supplemental Benefits ($ thousands) S_{fa}
1966	270	612	822	10.2	90
1967	--	3,155	3,155	13.8	435
1968	--	5,135	5,135	23.0	1,181
1969	690	7,906	8,596	27.9	2,398
1970	880	19,857	20,737	32.9	6,822
1971	1,050	30,552	31,603	38.6	12,199
1972	1,390	30,085	31,475	44.8	14,101
1973	1,440	49,501	50,941	50.5	25,725
1974	1,690	62,066	63,756	57.2	36,468

TABLE IX

CONVERSION OF ANNUAL STUDENT AID MONIES TO FISCAL BASIS

Year	50% of Annual Amount ($ thousands)	Fiscal Year Amount ($ thousands)
1966	45	
1967	218	263
1967	218	
1968	590	808
1968	590	
1969	1,199	1,789
1969	1,199	
1970	3,411	4,610
1970	3,411	
1971	6,100	9,511
1971	6,100	
1972	7,050	13,150
1972	7,050	
1973	12,862	20,012
1973	12,862	
1974	18,234	31,096

result of multiplying the benefits received from both sources by the proportion of students in community colleges. This estimate was probably conservative because it assumes that these benefit recipients are in the same proportion as community college enrollment, whereas their actual proportion is probably higher. This amount was also understated because a significant portion of student aid funds was not included.

The amount of federal benefits brought into Virginia by community college students had increased from $90,000 in 1966 to $36,468,000 in 1974. In order to convert this annual data to a fiscal year basis each annual amount was divided by two and split between the fiscal years. This calculation is located in Columns 6 and 7.

Business Volume (M & O). The determination of the business volume generated by the maintenance and operations expenditures is represented in Table X. The net wages (W) and the non-salary disbursements (T) were determined previously. The h factor is a constant based on the proportion of total spending spent within the state. In accordance with the formula $B_s(M\&O) = W + hT$, the business volume was calculated.

Table XI illustrates the business volume generated by new monies only. The business volume determined previously, $B_s(M\&O)$, was weighted for the proportion of revenues for the year that were out of state revenues to yield the factor generated by new monies, $B_s(M\&O)_n$. This factor was added to the student aid monies (S_{fa}) to

TABLE X

ECONOMIC IMPACT EQUATIONS - MAINTENANCE AND OPERATION MONIES

Fiscal Year	Net Wages W	h^1	Non-Salary Disbursements T	Net hT	Business Volume Generated by System B_s (M&O)
1966-67	$ 1,860,877	.75	$ 2,015,834	$ 1,511,876	$ 3,372,753
1967-68	4,770,832	.75	5,198,453	3,898,840	8,669,672
1968-69	8,239,294	.75	7,188,681	5,391,511	13,630,805
1969-70	11,526,234	.75	4,958,308	3,718,731	15,244,965
1970-71	14,798,289	.75	5,805,570	4,354,178	19,152,467
1971-72	19,621,459	.75	6,445,090	4,833,818	24,455,277
1972-73	25,553,216	.75	10,399,846	7,799,884	33,353,100
1973-74	31,934,220	.75	14,454,296	10,840,722	42,774,942

[1]Proportion spent in Virginia

TABLE XI

ECONOMIC IMPACT EQUATIONS - MAINTENANCE AND OPERATIONS - NEW MONIES

Fiscal Year	Business Volume Generated by System $B_s(M\&O)$	+	Out-of-State Funding Proportion n	=	Business Volume Generated by New Money $B_s(M\&O)_n$	+	Student Aid Monies S_{fa}	=	New Money Business Volume $B_s(M\&O)_a$
1966-67	$ 3,372,753		23.4%		$ 789,224		$ 263,000		$ 1,052,224
1967-68	8,669,672		22.5		1,950,676		808,000		2,758,676
1968-69	13,630,805		23.6		3,216,870		1,789,000		5,005,870
1969-70	15,244,965		10.4		1,585,476		4,610,000		6,195,476
1970-71	19,152,467		10.0		1,915,247		9,511,000		11,426,246
1971-72	24,455,277		11.2		2,738,991		13,150,000		15,888,991
1972-73	33,353,100		12.1		4,035,725		20,012,000		24,047,725
1973-74	24,774,942		11.8		5,047,443		31,096,000		36,143,443

yield the business volume generated by new money, $B_s(M\&O)_a$. This increased at a steady rate from $1,052,224 in 1966 to $36,143,443 in 1974.

Impact of Capital Monies

Capital Funds. The capital funds expenditures from 1966-67 to 1973-74 are shown in Table XII. These expenditures were broken down by source of funds: local, state, and federal. As can be seen, federal funds accounted for a significant portion of capital spending from 1966-67 to 1970-71, ranging from 23.0% to 41.9% ($1,146,631 to $2,832,848) of all expenditures. 1971-72 and the fiscal years following, showed a significant drop in the proportion of federal funds and a concommitant increase in state spending. The proportion of local funds was relatively stable except for 1968-69 when local funding accounted for 59.7% of the capital budget. Most local funds are used for site acquisition and preparation. By 1974, $96,264,816 had been spent on capital construction for the community colleges. Of this amount, 18.9% was local money, 61.8% state money, and 19.3% federal money.

Table XIII is a breakdown of the various sources of federal funds for the years 1966 through 1974. No breakdown of sources was available for 1974. This data is provided for reference purposes.

Business Volume (C). To determine the business volume generated, the capital expenditures from Table XII were weighted by the proportion of spending within the state, h. The result was the

TABLE XII

APPROPRIATIONS FOR CAPITAL EXPENDITURES BY SOURCE

Fiscal Year	Local Funds	Per-cent	State Funds	Per-cent	Federal Funds	Per-cent	Total
1966-67	$ 667,667	9.9	$ 3,252,043	48.2	$2,832,848	41.9	$ 6,752,558
1967-68	3,464,588	34.0	2,927,003	28.7	3,804,244	37.3	10,195,835
1968-69	2,985,819	59.7	865,908	17.3	1,146,631	23.0	4,998,358
1969-70	1,752,184	18.3	5,154,091	53.9	2,652,385	27.8	9,558,660
1970-71	1,658,341	17.8	4,314,952	46.3	3,344,382	35.9	9,317,675
1971-72	2,362,562	14.6	11,379,601	70.2	2,471,159	15.2	16,213,322
1972-73	3,705,103	13.9	21,527,270	80.8	1,405,099	5.3	26,637,472
1973-74	1,589,435	12.6	10,041,601	79.7	959,900	7.7	12,590,936
Totals	$18,185,699	18.9	$59,462,469	61.8	$18,616,648	19.3	$96,264,816

Source: Unpublished Data - Virginia Department of Community Colleges

TABLE XIII

FEDERAL SOURCES OF CAPITAL EXPENDITURES

Fiscal Year	Higher Education Facilities Act		Vocational Education		Total
	Regular	Appal[1]	Regular	Appal[1]	
1966-67	$ 2,101,847 74.2%	-0-	$ 731,001 25.8%	-0-	$ 2,832,848
1967-68	3,026,898 79.6%	137,468 3.6%	449,700 11.8%	190,178 5.0%	3,804,244
1968-69	455,697 39.7%	620,000 54.1%		70,934 6.2%	1,146,631
1969-70	1,908,903 72.0%	698,311 26.3%	-0-	45,171 1.7%	2,652,385
1970-71	1,995,842 59.7%	617,011 18.5%	602,278 18.0%	129,251 3.8%	3,344,382
1971-72	1,913,600 77.5%	166,158 6.7%	266,622 10.8%	124,779 5.0%	2,471,159
1972-73	1,014,900 72.2%	-0-	-0-	390,199 27.8%	1,405,099
1973-74	NA	NA	NA	NA	959,900
Totals	$12,417,687	$2,238,948	$2,049,601	$950,512	$18,616,648

Source: Unpublished Data, Virginia Department of Community Colleges

[1]Appalachian Funds

business volume generated by capital expenditures, $B_s(C)$. This factor was weighted by the proportion of out-of-state funds to derive the business volume from capital expenditures funded by new monies, $B_s(C)_a$. The results of these calculations are in Table XIV.

Business Volume Generated by the VCCS

Business Volume of Total Monies. The business volume generated by the total amount of funds spent in relation to the community colleges is presented in Table XV. The volume, B_s, was the sum of the volume generated through maintenance and operations expenditures, $B_s(M\&O)$, the volume generated through capital expenditures, $B_s(C)$, and the student aid monies attracted into the state, S_{fa}.

As can be observed, the business volume generated by the Virginia Community College System increased at a dramatic rate. From a volume of $8,700,171 in 1966-67, it increased to $83,314,144 by 1973-74. It should be noted that student aid monies were the fastest growing factor within this model, although the business volume generated through the M & O expenditures also increased significantly.

Business Volume of New Monies. As was discussed in the review of literature, the business volume generated by the total monies of the Virginia Community College System is misleading because it ignored the exchange that took place between communities and the state through the tax system. Therefore, this analysis also investigated the business volume generated by new monies only. As was mentioned earlier, new monies were monies not appropriated from

TABLE XIV

ECONOMIC IMPACT EQUATIONS - CAPITAL

Fiscal Year	h[1]	Capital Expenditures C	=	Business Volume Generated $B_s(C)$[2]	Out-of-State Funding Proportion n	=	Business Volume Generated by New Monies $B_s(C)_a$[3]
	(1)	(2)		(3)	(4)		(5)
1966-67	.75	$ 6,752,558		$ 5,064,418	4.19%		$ 2,121,911
1967-68	.75	10,195,835		7,646,876	3.73		2,852,285
1968-69	.75	4,998,358		3,748,768	2.30		862,196
1969-70	.75	9,558,660		7,168,995	2.78		1,992,981
1970-71	.75	9,317,675		6,988,256	3.59		2,508,784
1971-72	.75	16,213,322		12,159,991	1.52		1,848,318
1972-73	.75	26,637,472		19,978,104	0.53		1,058,840
1973-74	.75	12,590,936		9,443,202	0.77		727,127
Totals	.75	$96,264,816		$72,198,612	1.93		$13,934,332[4]

[1]Proportion spent in Virginia

[2]Column (1) times Column (2)

[3]Column (3) times Column (4)

[4]May not add due to rounding

TABLE XV

ECONOMIC IMPACT EQUATIONS - BUSINESS VOLUME
GENERATED BY VCCS

Fiscal Year	$B_s(M\&O)^1$	+	$B_s(C)^2$	+	$S_{fa}{}^3$	=	$B_s{}^4$
1966-67	$ 3,372,753		$ 5,064,418		$ 263,000		$ 8,700,171
1967-68	8,669,672		7,646,876		808,000		17,124,548
1968-69	13,630,805		3,748,768		1,789,000		19,168,578
1969-70	15,244,965		7,168,995		4,610,000		27,023,960
1970-71	19,152,467		6,988,256		9,511,000		35,651,723
1971-72	24,455,277		12,159,991		13,150,000		49,765,268
1972-73	33,353,100		19,978,104		20,012,000		73,343,204
1973-74	42,774,942		9,443,202		31,096,000		83,314,144

[1]Business Volume generated by M & O expenditures

[2]Business Volume generated by Capital expenditures

[3]Federal Supplemental Student Aid Monies

[4]Business Volume generated by VCCS

the state budget or received from students already in the area.

The result of this analysis is included in Table XVI. The factors included in determining the business volume were the new business volume from the M & O budget, $B_s(M\&O)_a$, and the new business volume generated from the capital budget, $B_s(C)_a$. This analysis yielded a business volume which was somewhat lower than that generated by the total monies. However, it is significant to note that this volume, B_{sa}, was generated by funds which might not have been attracted into the state without the presence of the community colleges.

Business volume from new monies increased from $3,174,135 in 1966-67 to $36,870,570 in 1973-74, an increase of 10.6 times. The increase from the business volume generated by total monies was 8.58 times. Therefore, the new monies showed a faster growth rate than did total monies.

Employment Impact of the VCCS

Determination of Full-Time Equivalent Faculty and Staff. The determination of full-time faculty is found in Table XVII. The data for full-time faculty and classified and part-time faculty was provided by the personnel department of the Virginia Department of Community Colleges. The VDCC also estimated the part-time faculty to be one-third the number of full-time faculty.

The conversion of part-time classified to full-time equivalent classified was based on the assumption that the average part-time classified person worked twenty hours per week. Therefore, the number of part-time classified personnel was divided by two to

TABLE XVI

ECONOMIC IMPACT EQUATIONS - BUSINESS VOLUME
GENERATED BY VCCS (NEW MONIES)

Fiscal Year	$B_s(M\&O)_a$ [1]	+	$B_s(C)_a$ [2]	=	B_{sa} [3]
1966-67	$ 1,052,224		$2,121,911		$ 3,174,135
1967-68	2,758,676		2,852,285		5,610,916
1968-69	5,005,870		862,196		5,068,066
1969-70	6,195,476		1,992,981		8,188,457
1970-71	11,426,246		2,508,784		13,935,030
1971-72	15,888,991		1,848,318		17,737,309
1972-73	24,047,725		1,058,840		25,106,565
1973-74	36,143,443		727,127		36,870,570

[1] Business volume generated by new M & O monies

[2] Business volume generated by new Capital monies

[3] Business volume generated by VCCS (new monies)

TABLE XVII

DETERMINATION OF FULL TIME EQUIVALENT FACULTY AND STAFF

Fiscal Year	Full Time Class	Full Time Faculty	Total Full Time	Part Time Class	Part Time Fac	FTE Part Time Class	FTE Part Time Fac	FTE Part Time Total	FTE Faculty and Staff
1966-67	98	195	293	69	65	35	13	48	341
1967-68	318	386	704	257	129	129	26	155	859
1968-69	568	672	1,240	566	244	283	45	328	1,568
1969-70	779	755	1,534	607	252	304	50	354	1,888
1970-71	700	1,052	1,752	772	351	386	70	456	2,208
1971-72	909	1,416	2,325	2,265	472	1,132	94	1,226	3,551
1972-73	1,122	1,803	2,925	1,805	601	902	120	1,022	3,947
1973-74	1,349	1,946	3,295	803	615	402	123	525	3,820
1974-75	1,579	2,177	3,756	1,845	726	922	145	1,067	4,823
1975-76	1,749	2,400	4,149	1,208	800	604	160	764	4,913

Source: Unpublished Data, Virginia Department of Community Colleges based on employment census as of January 1, 1967 through 1976

derive the full-time equivalent personnel.

The conversion of part-time faculty to full-time equivalent faculty was based on the assumption that the average part-time faculty member taught one course for three credits. Since the average teaching load in the Virginia community colleges is five courses for fifteen credits, the number of part-time faculty was divided by five to derive the full-time equivalent faculty.

The full-time equivalent faculty and staff is the sum of the regular full-time faculty and classified staff plus the full-time equivalents of part-time classified and faculty.

Employment Impact of Total Funds. The determination of the full-time jobs created by the presence of the Virginia community colleges was based on the formula $J = E + (p \times B_s)$, where J was the employment impact, E was the full-time equivalent faculty and staff, p was the employment requirements coefficient, and B_s was the business volume generated by the Virginia Community College System. The result of this calculation for each of the fiscal years 1966-67 through 1973-74 is presented in Table XVIII. The number of jobs related to the presence of the community colleges ranges from 1,124 in 1966-67 to 11,318 in 1973-74 for total monies.

Employment Impact of New Monies. In the same way that the business volume generated by new monies was a more valid measure of the VCCS's impact, so the new monies calculation is also a more appropriate calculation of the number of new positions created by the VCCS. To determine the number of new positions created, the

TABLE XVIII

ECONOMIC IMPACT OF THE VCCS ON EMPLOYMENT - TOTAL MONIES

Fiscal Year	Full Time Equivalent Faculty E	+	Employment Requirements Coefficient (p	X	Business Volume B_s)	pB_s	=	Employment Impact - Total Funds J
1966-67	341		.00009		$ 8,700,171	783		1,124
1967-68	859		.00009		17,124,548	1,541		2,400
1968-69	1,568		.00009		19,168,578	1,725		3,293
1969-70	1,888		.00009		27,023,960	2,432		4,320
1970-71	2,208		.00009		35,651,723	3,209		5,417
1971-72	3,551		.00009		49,765,268	4,479		8.030
1972-73	3,947		.00009		73,343,204	6,600		10,547
1973-74	3,820		.00009		83,314,144	7,498		11,318

full-time equivalent employment of the VCCS was weighted by the proportion of new monies, and this figure was added to the product of the employment requirements coefficient and the business volume generated by new monies, B_{sa}. The results of this calculation are presented in Table XIX.

The new employment generated by the VCCS through new monies ranged from 366 positions in 1966 to 3,769 in 1974. These new positions are approximately 30% of the total employment generated by the VCCS, ranging from 29.9% in 1966-67 to 33.3% in 1973-74.

Business Volume Impact of the VCCS

Business Volume Impact of Total Monies. The economic impact of the total monies of the VCCS on state business is exhibited in Table XX. The equation to calculate the impact is $BV = B_s + B_s m_i$, where BV is the economic impact of the business volume, B_s is the business volume generated and m_i is the income induced requirement per dollar of final demand. The factor m_i recognizes the additional value of local industrial and commercial output when household income and expenditures are recycled. Caffrey found that this factor ranged from .20 to .40. A conservative estimate of .20 was used in this study.

The business volume generated by the VCCS ranged from $10.4 million in 1966-67 to almost $100 million in 1973-74.

Business Volume Impact of New Monies. The calculation for the economic impact of new monies utilizes the same formula as that

TABLE XIX

ECONOMIC IMPACT OF THE VCCS ON EMPLOYMENT - NEW MONIES

Fiscal Year	FTE Faculty and Staff E	% of Out-of State Funds	Adjusted FTE Faculty and Staff E_a	Employment Requirements Coefficient p	Business Volume Generated - New Monies B_{sa}	pB_{sa}	New Employment J_a
1966-67	341	23.4%	80	.00009	$ 3,174,135	286	366
1967-68	859	22.5	193	.00009	5,610,961	504	697
1968-69	1568	23.6	353	.00009	11,479,027	1,033	1,386
1969-70	1888	10.4	196	.00009	8,188,457	737	933
1970-71	2209	10.0	221	.00009	13,935,030	1,254	1,475
1971-72	3551	11.2	398	.00009	17,737,309	1,596	1,994
1972-73	3947	12.1	478	.00009	25,106,565	2,260	2,738
1973-74	3820	11.8	451	.00009	36,870,570	3,318	3,769

TABLE XX

ECONOMIC IMPACT OF THE VCCS ON STATE BUSINESS VOLUME

Fiscal Year	B_s	$B_s m_i$ [1]	BV [2]
1966-67	$ 8,700,171	$ 1,740,034	$10,440,205
1967-68	17,124,548	3,424,910	21,549,458
1968-69	19,168,578	3,833,716	23,002,294
1969-70	27,023,960	5,404,792	32,428,752
1970-71	35,651,723	7,130,345	42,782,068
1971-72	49,765,268	9,953,054	59,718,321
1972-73	73,343,204	14,668,640	88,011,844
1973-74	83,314,144	16,662,828	99,976,972

[1] m_i = .2 = Estimated Income Requirement per Dollar of Final Demand

[2] BV = Economic Impact of VCCS on State Business Volume

for total monies. The major modification to the formula was the utilization of the business volume generated from new monies, B_{sa}, rather than the volume generated from total monies. The impact of the new monies ranged from $3,808,962 in 1966-67 to $44,244,684 in 1973-74, as shown in Table XXI. When these business impacts were related back to the total M & O expenditures of the VCCS, they showed that the business volume generated by new monies compared most favorably to the total M & O expenditures. In 1966-67 the new business volume generated 87.8% of the total M & O budget and in fact actually exceeded the state general fund appropriation for that year. Since that time, however, the business generated has continued to compare favorably with both the M & O budget and the state general fund appropriation. In 1973-74 the business volume was 79.8% of the M & O budget and again exceeded the general fund appropriation, although this had not occurred since 1968-69.

Income Impact of the VCCS

The final aspect of economic impact to be investigated by this part of the report will be the economic impact of the Virginia Community College System on the income of the state. As has been done with the previous impacts, this one will also be analyzed in terms of both total monies and new monies.

Income Impact of Total Monies. The economic impact of total monies on the income of the state is presented in Table XXIV. The impact was measured using two types of initial income multipliers and one internal multiplier. The multiplier calculations are included

TABLE XXI

ECONOMIC IMPACT OF THE VCCS ON STATE BUSINESS VOLUME - NEW MONIES

Fiscal Year	B_{sa}	$B_{sa}m_i$	BV_a [1]
1966-67	$ 3,174,135	$ 634,827	$ 3,808,962
1967-68	5,610,961	1,122,192	6,733,153
1968-69	11,479,027	2,295,805	13,774,832
1969-70	8,188,457	1,637,691	9,826,148
1970-71	13,935,030	2,787,006	16,722,036
1971-72	17,737,309	3,547,462	21,284,771
1972-73	25,106,565	5,021,313	30,127,878
1973-74	36,870,570	7,374,114	44,244,684

[1] BV_a = Economic Impact of the VCCS on State Business of New Monies only

TABLE XXII

ECONOMIC IMPACT EQUATIONS - INCOME - TOTAL MONIES

Fiscal Year	Income Multiplier Type	Income Multiplier α	W	αW	Internal Multiplier Ω	$B_s - W$	$\Omega(B_s - W)$
1966-67	I	1.04565	$ 1,860,877	$ 1,945,826	1.64941	$ 6,839,294	$11,280,799
	II	1.42613		2,653,852			
1967-68	I	1.04565	4,770,832	4,988,620	1.64941	12,353,716	20,376,342
	II	1.42613		6,803,827			
1968-69	I	1.04565	8,239,294	8,615,418	1.64941	10,929,284	18,026,870
	II	1.42613		11,750,304			
1969-70	I	1.04565	11,526,234	12,052,406	1.64941	15,497,726	25,562,104
	II	1.42613		16,437,908			
1970-71	I	1.04565	14,798,289	15,473,830	1.64941	20,853,434	34,395,862
	II	1.42613		21,104,283			
1971-72	I	1.04565	19,621,459	20,517,178	1.64941	30,143,804	49,719,500
	II	1.42613		27,982,751			
1972-73	I	1.04565	25,553,216	26,719,720	1.64941	47,789,994	78,825,294
	II	1.42613		36,442,207			
1973-74	I	1.04565	31,934,220	33,392,017	1.64941	51,379,924	84,746,560
	II	1.42613		45,542,349			

TABLE XXIII

ECONOMIC IMPACT EQUATION - INCOME - NEW MONIES

Fiscal Year	Income Multiplier Type	α	W_a	αW_a	Internal Multiplier Ω	$B_{sa}-W_a$	$\Omega(B_{sa}-W_a)$
1966-67	I	1.04565	$ 435,445	$ 455,323	1.64941	$ 2,738,690	$ 4,517,223
	II	1.42613		621,001			
1967-68	I	1.04565	1,073,437	1,122,439	1.64941	4,537,479	7,484,163
	II	1.42613		1,530,861			
1968-69	I	1.04565	1,944,473	2,033,238	1.64941	3,123,593	5,152,085
	II	1.42613		2,773,071			
1969-70	I	1.04565	1,198,728	1,253,450	1.64941	6,989,729	11,528,928
	II	1.42613		1,709,542			
1970-71	I	1.04565	1,479,829	1,547,383	1.64941	12,455,201	20,543,733
	II	1.42613		2,110,428			
1971-72	I	1.04565	2,197,603	2,297,924	1.64941	15,539,706	25,631,346
	II	1.42613		3.134,068			
1972-73	I	1.04565	3,091,939	3,233,086	1.64941	22,014,626	36,311,144
	II	1.42613		4,409,507			
1973-74	I	1.04565	3,768,238	3,940,258	1.64941	33,102,332	54,599,317
	II	1.42613		5,373,997			

TABLE XXIV

ECONOMIC IMPACT OF THE VCCS ON INCOME

Fiscal Year	Regular Monies $\alpha W + \Omega (B_s - W)$		New Monies $\alpha W_a + \Omega (B_{sa} - W_a)$	
	Type I Multiplier	Type II Multiplier	Type I Multiplier	Type II Multiplier
1966-67	$ 13,226,625	$ 13,934,651	$ 4,972,546	$ 5,138,224
1967-68	25,364,962	27,180,169	8,606,602	9,015,024
1968-69	26,642,287	29,777,174	7,185,323	7,925,156
1969-70	37,614,510	42,000,012	12,782,378	13,238,469
1970-71	49,869,692	55,500,145	22,091,116	22,654,161
1971-72	70,702,251	77,702,251	27,929,269	28,765,413
1972-73	105,545,014	115,267,501	39,544,230	40,953,737
1973-74	118,138,577	130,288,909	58,539,575	59,973,314

in Table XXII and XXIII. The type I multiplier measured the direct and indirect effects on income of the initial investment. The type II multiplier measured the induced effects as well as the direct and indirect effects. The type I multiplier is a more conservative measure of the total income impact.

By utilizing the range of economic impacts between the effects generated by the two types of multipliers,it was possible to feel more confident of the impact of the Virginia Community College System on the state's individual income. The range in 1966-67 was $13,226,625 to $13,934,651. The range became progressively wider, until, in 1973-74, it was $118,138,577 to $130,288,909. This income impact was more than twice the total M & O budget for 1973-74, a fact which indicates that the community colleges are returning considerably more income to the state than they are drawing.

Income Impact of New Monies. When correction is made in the equations mentioned above for new monies attracted into the state, the basic effect remains the same. In 1966-67 and in 1973-74 the range of income impact was greater than the total M & O budget. During the intervening years the total income impact was less than the M & O budget but tended to remain near it.

Summary

This section of the results chapter has presented the data relevant to the economic impact model. Three types of impact were measured; business volume, employment, and income. These impacts were analyzed in terms of total monies and new monies.

The business volume impact was ranged from $10,440,205 in 1966-67 to $99,976,972 for total monies. For new monies it has ranged from $3,808,962 in 1966-67 to $44,244,684 in 1973-74.

The employment impact in 1966-67 was 1,124 jobs for total monies. By 1973-74, this had increased to 11,318 jobs. The employment impact of new monies increased from 366 jobs in 1966-67 to 3,769 jobs in 1973-74.

The income impact of the Virginia Community College System was expressed as a range. The total money impact on income for 1966-67 was $13,226,625 to $13,934,651. By 1973-74 this range had increased to a level of $118,138,577 to $130,577. The new money income impact was significant. The 1966-67 range was $4,972,546 to $5,138,224. This grew to an impact of $58,539,575 to $59,973,314 by 1973-74.

ECONOMIC INDICATOR TRENDS

This section of the study compares the performance of selected economic indicators in Virginia before and after the establishment of the Virginia Community College System. Two points of reference were used in this analysis. The first was the performance of the nation as shown by the economic indicators. The second was a comparison between trends prior to 1966 and trends after 1966. The following indicators were selected for this study.

Average weekly and hourly earnings and average weekly hours for production workers in manufacturing

Unemployment rate

Personal income

Per capita personal income

Employment in the non-agricultural establishment

Personal income by place of work--
+ wage and salary income
+ other labor income
+ proprietor's income

Performance of Selected Indicators

Wage and Hour Data. Average weekly and hourly earnings and average weekly hours for production workers in manufacturing industries were chosen to measure the change, if any, in employment between relatively high-paid and low-paid work and high and low wage industries. This data does not reflect average wage rates or the total cost of labor.

Appendix A shows that Virginia's average weekly earnings for production workers increased from $56.66 to $145.25, or $88.59 between 1954 and 1974. During this same period of time, the national average increased $105.51, from $70.49 to $176.00. This represented a 156% increase for Virginia and a 150% increase for the national average. Figure 4-1 shows that the average weekly earning began to increase sharply in 1968, and Virginia's average earnings for the first time since 1951 (and perhaps earlier) began to close (albeit slowly) the gap with the national average.

Since 1969 Virginia has reported generally lower average weekly hours than the national average, as is shown in Figure 4-2. Prior to 1969, Virginia's average hours exceeded the U.S. average.

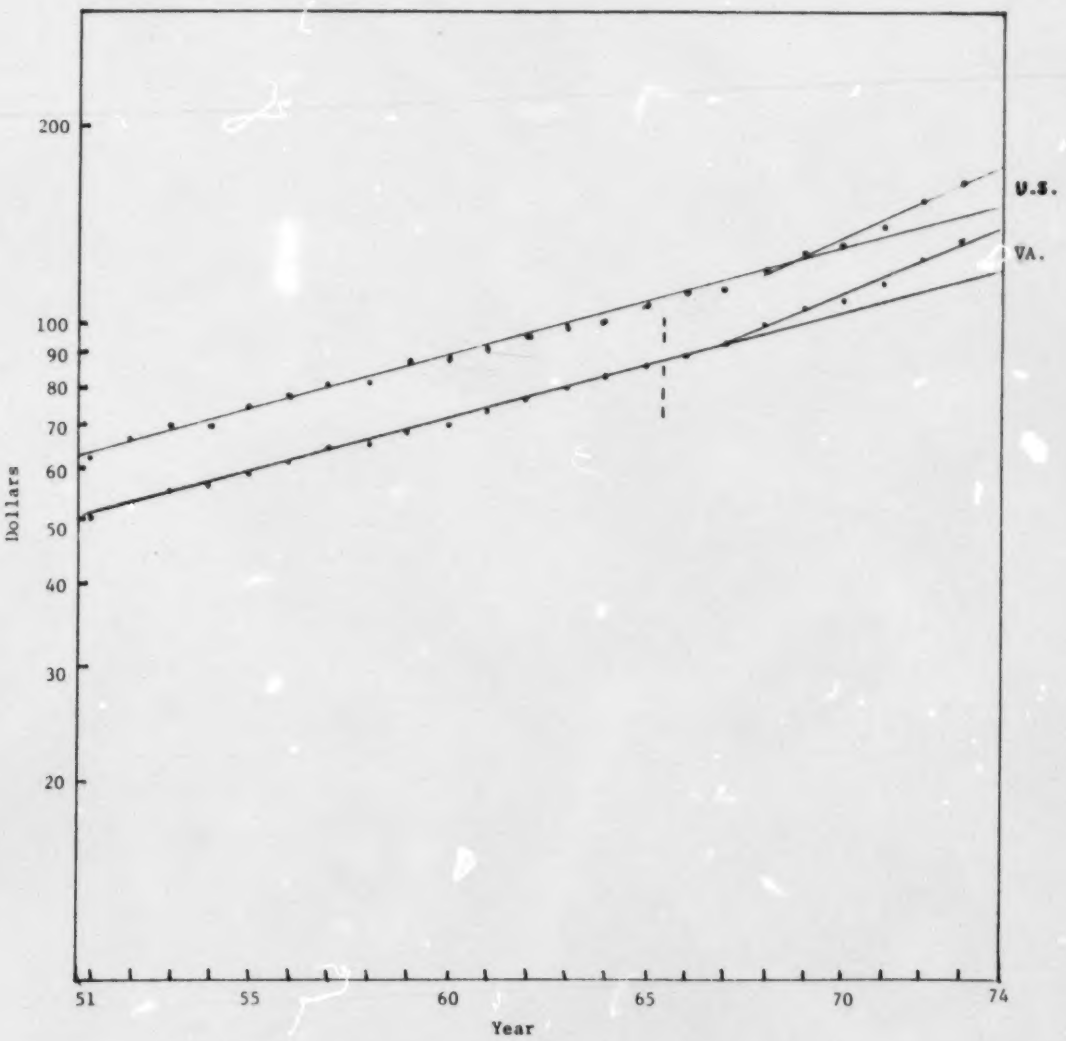


Figure 4-1. Average Weekly Earnings--
Production Workers, Manufacturing

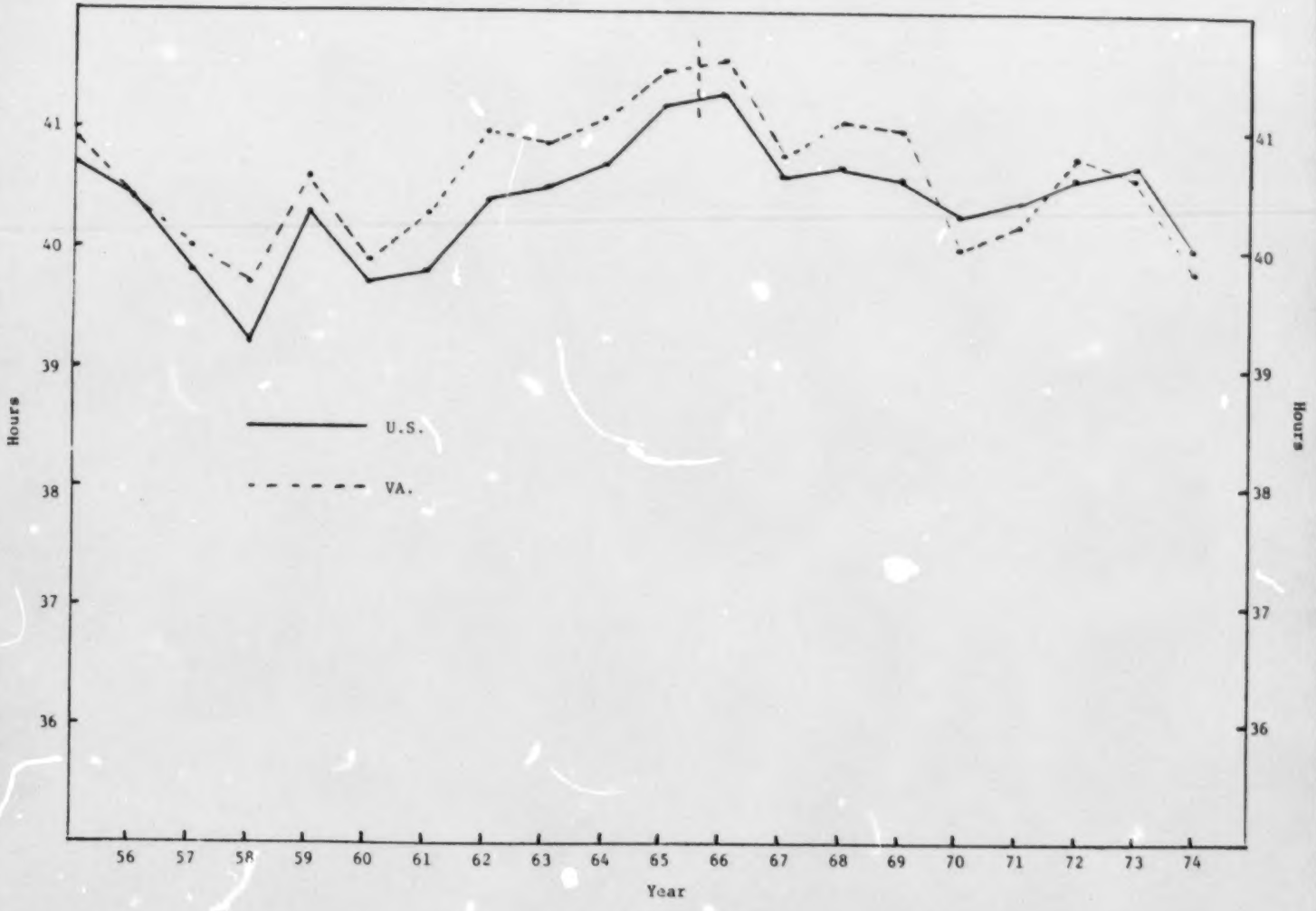


Figure 4-2. Average Weekly Hours--Production Workers, Manufacturing

The pattern for Virginia is relatively consistent with the national pattern.

An analysis of Virginia's average hourly earnings indicates that they have increased 157% since 1954, whereas the national average increased 147%. Figure 4-3 is a graphical representation of this comparative increase. Virginia's rate of change increased after 1966, most markedly since 1968. Although the national average also underwent a change, it does not appear to be as great a change as that in Virginia. In 1966 the national average hourly earnings increased 54% over the 1954 level, but the increase in Virginia was 53%. Therefore, most of Virginia's increase had occurred since 1966.

Unemployment rate. The unemployment rates for Virginia and the United States for the years 1958 through 1974 are shown in Appendix B. As Figure 4-4 shows, unemployment in Virginia tends to follow the same pattern as the national average. However, the gap between the national average and Virginia is getting narrower. Prior to 1966, the average variation between the national unemployment and Virginia's was 1.65%. Since 1966 the average difference between these rates narrowed to 1.34%.

Personal and Per Capita Income. Personal income and per capita personal income showed the greatest change over time. Appendix C contains the data for these two factors for both the United States and Virginia since 1951. As illustrated in Figure 4-5, since 1966 Virginia's rate of growth in personal income has been greater than the growth for the United States. Virginia's rate of

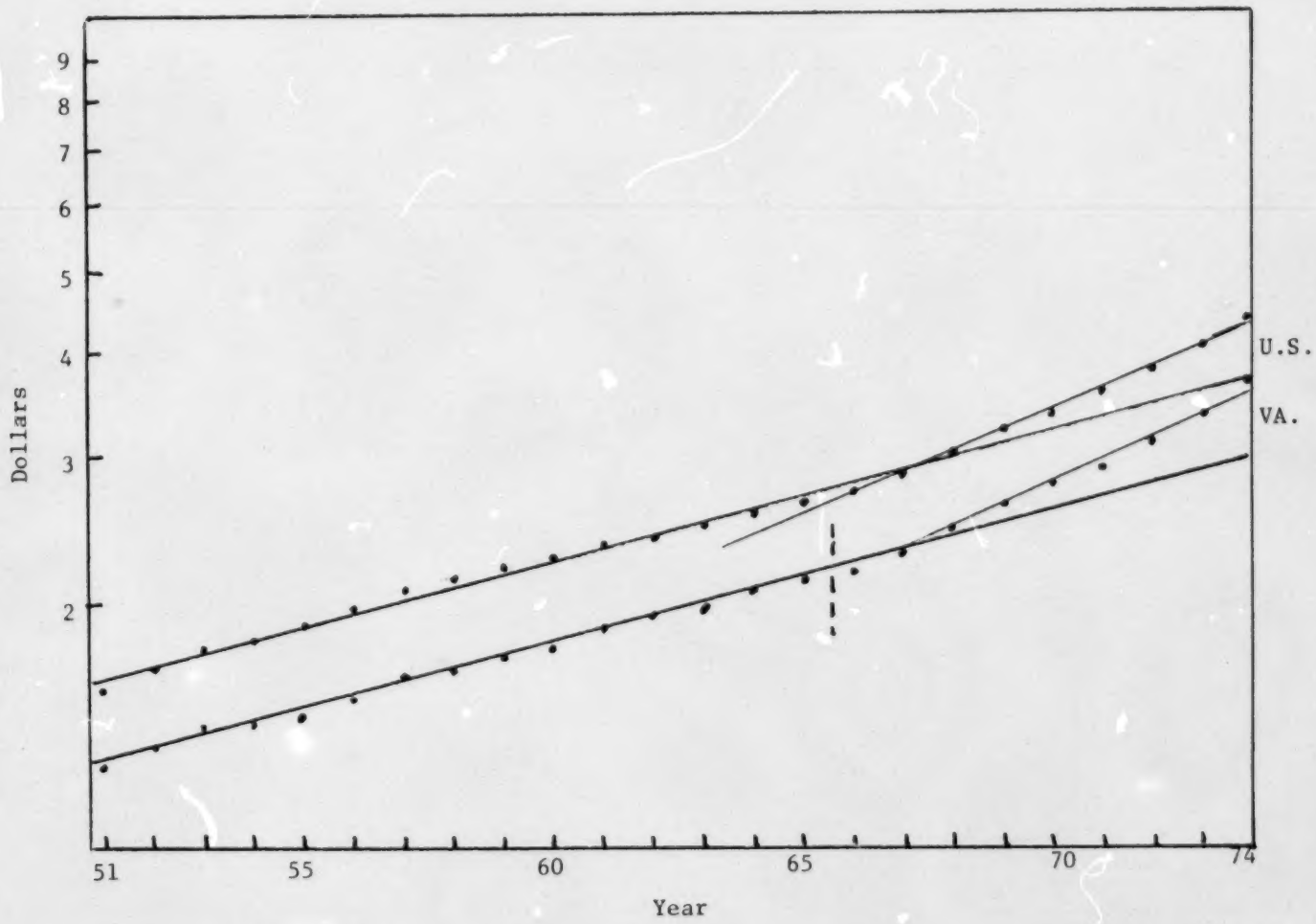


Figure 4-3. Average Hourly Earnings--Production Workers, Manufacturing

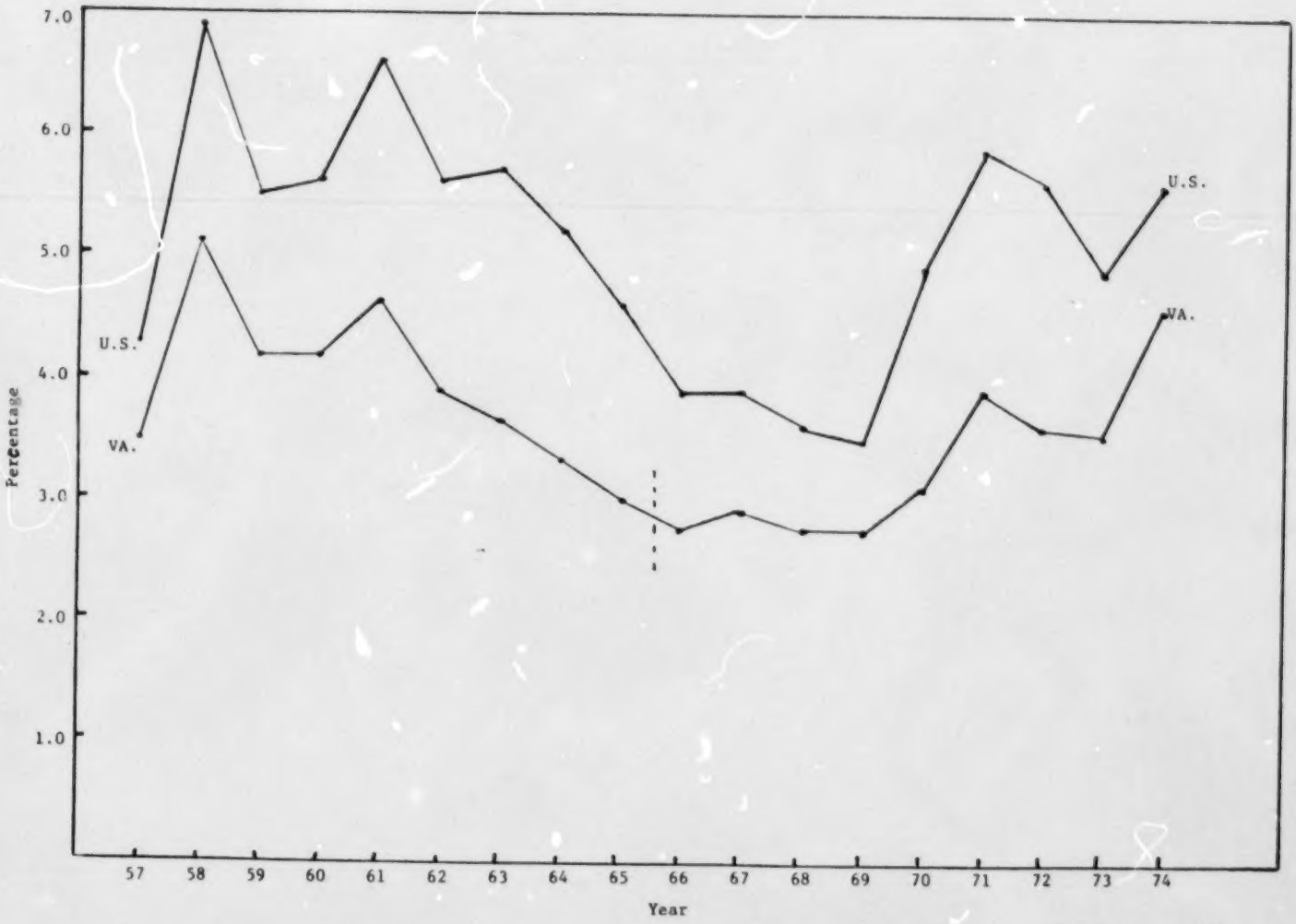


Figure 4-4. Unemployment Rate

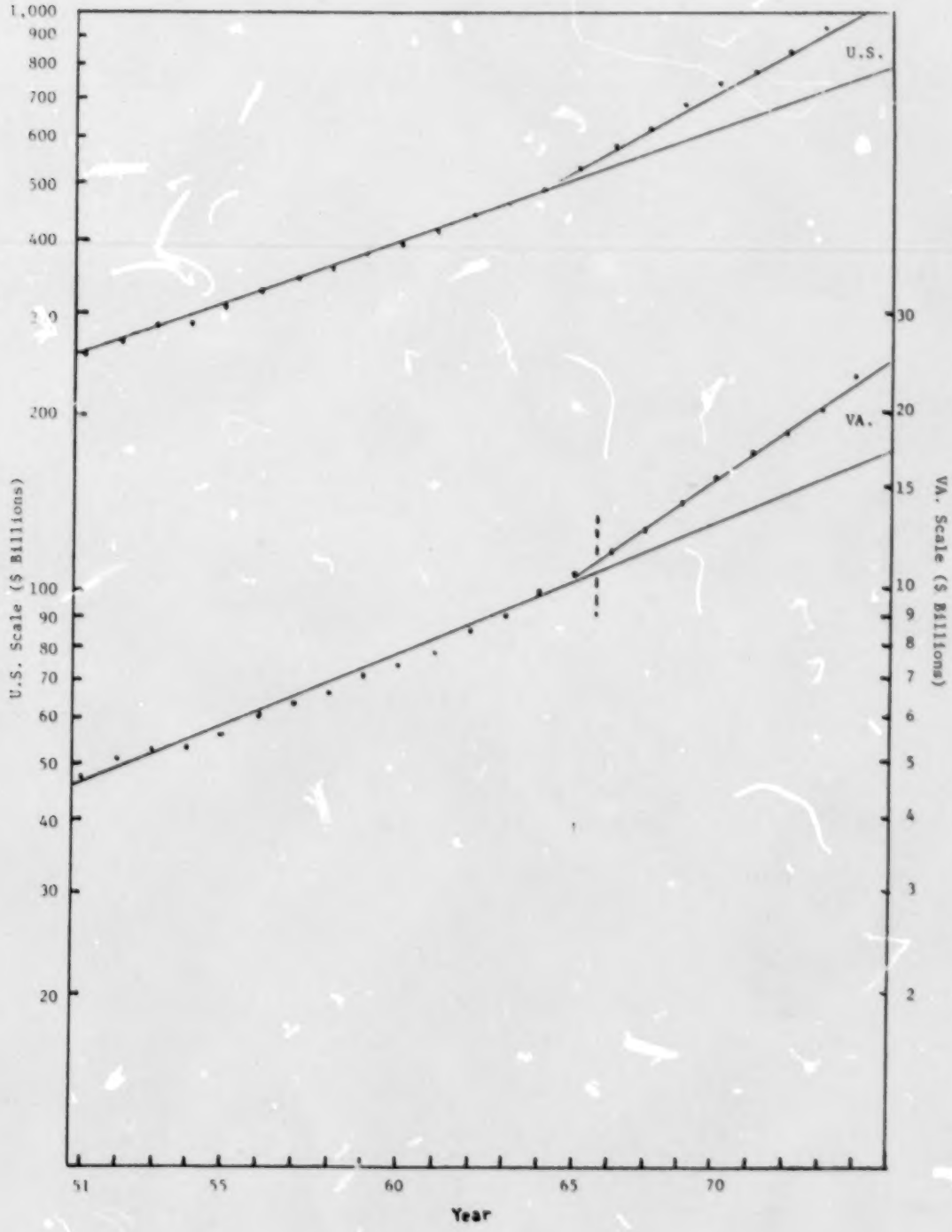


Figure 4-5. Personal Income

growth since 1966 has also been significantly greater than the growth rate prior to 1966. The growth rate started to accelerate in 1964, but it has increased markedly since 1967.

The performance of per capita income was impressive. It grew at a rate significantly faster since 1966 than it had been prior to 1966, and it grew more rapidly than the national average per capita income. Moreover, Virginia's per capita income as a percentage of the national average continued to increase from 83.9% in 1951 to 99.1% in 1974. This performance is illustrated in Figure 4-7.

Virginia's per capita income as a percentage of national income was also compared with the regional performances of the Southeast and Mideast as shown in Appendix D. However, there was no significant change in the relationship of Virginia to its region. As Figure 4-8 shows, Virginia's per capita income was larger than its region's average. Virginia and the Southeast region have shown consistent gains whereas the Mideast showed a downward trend.

Non-agricultural Employment. Employment in the non-agricultural establishment for the United States and Virginia is presented in Appendix E and illustrated in Figure 4-9. As can be seen in this figure, Virginia's growth rate in non-agricultural employment increased at a greater rate than the growth in the United States and has increased at a greater rate since 1966 than prior to that time.

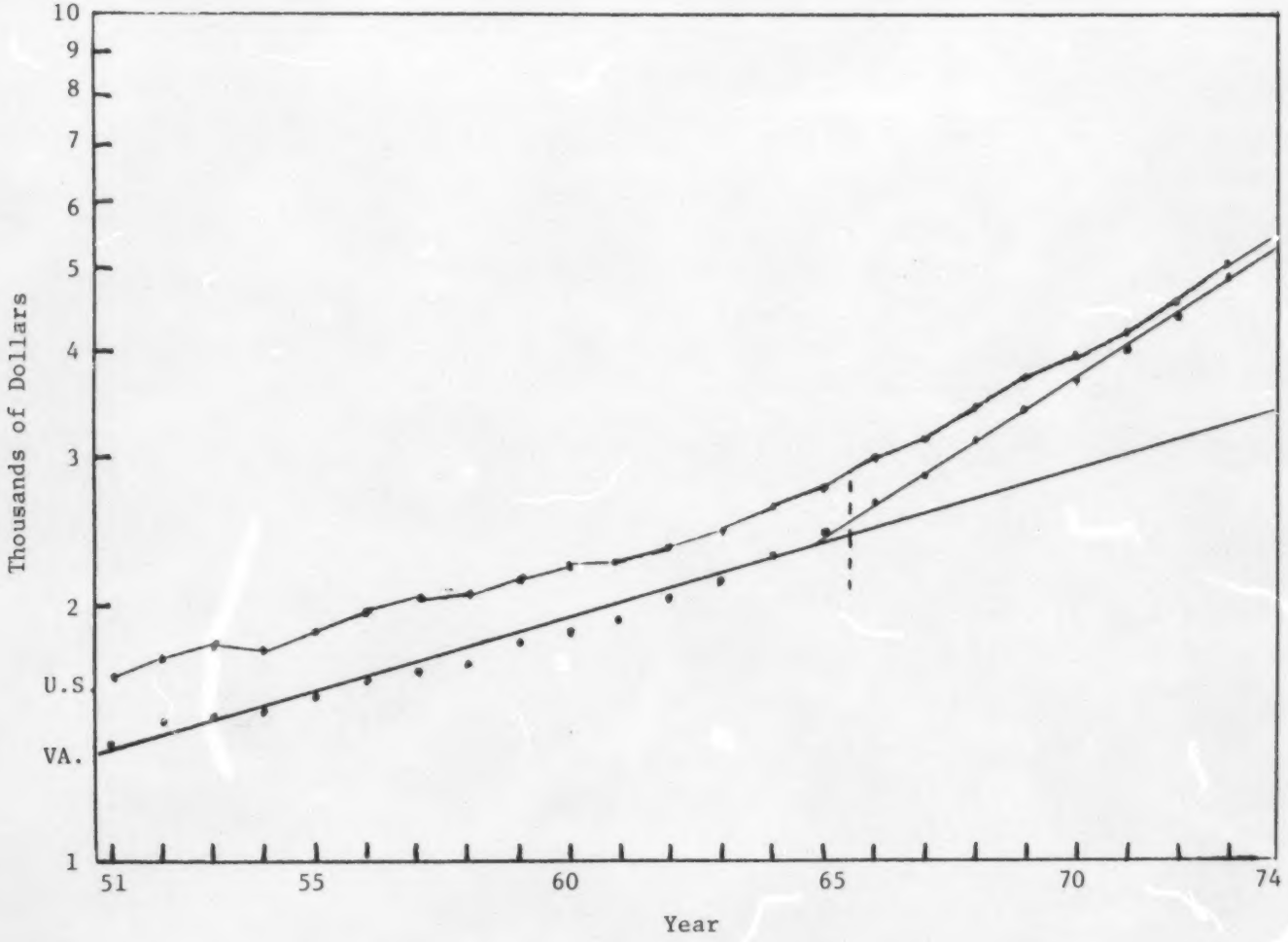


Figure 4-6. Per Capita Income

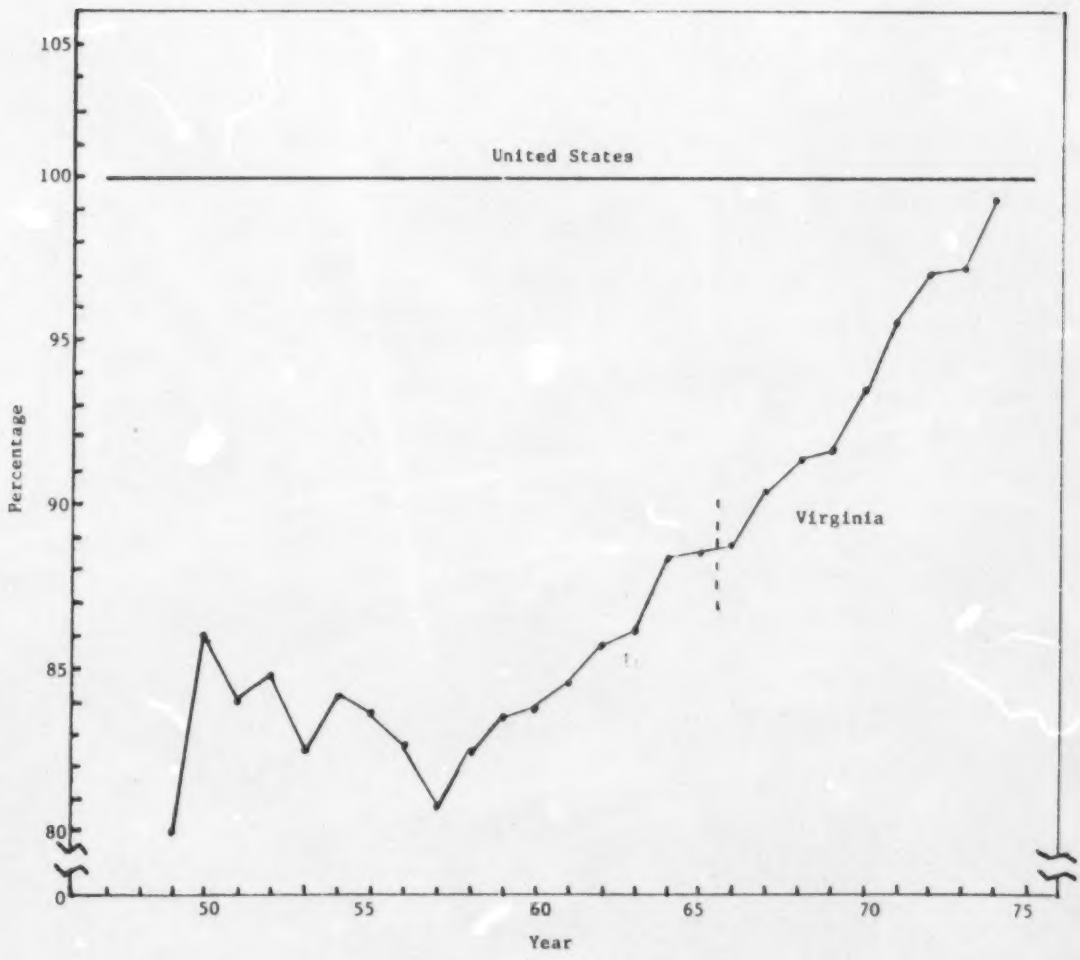


Figure 4-7. Virginia Per Capita Income as a Percentage of the United States Average

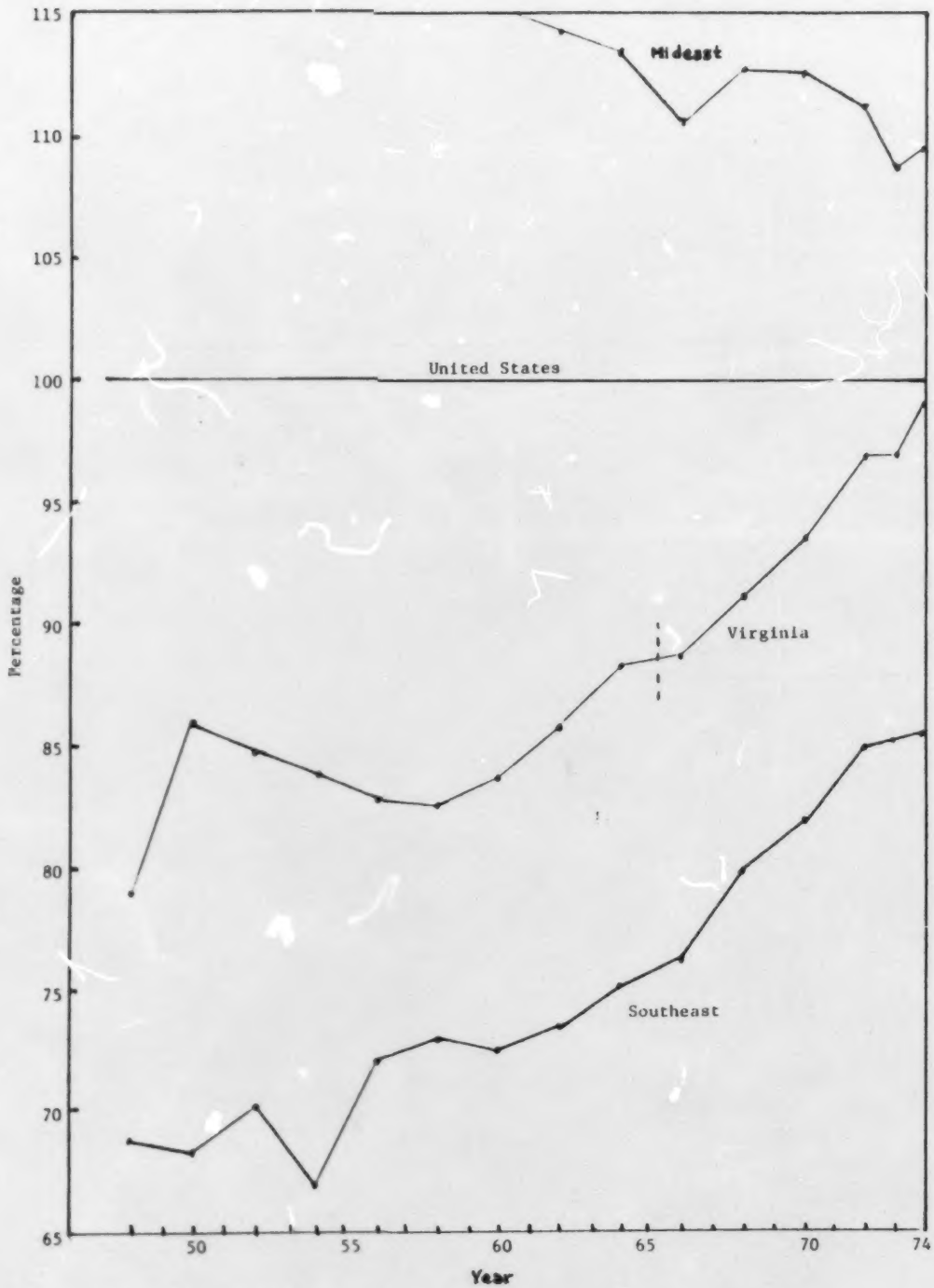


Figure 4-8. Regional Per Capita Income as % of U.S. Average

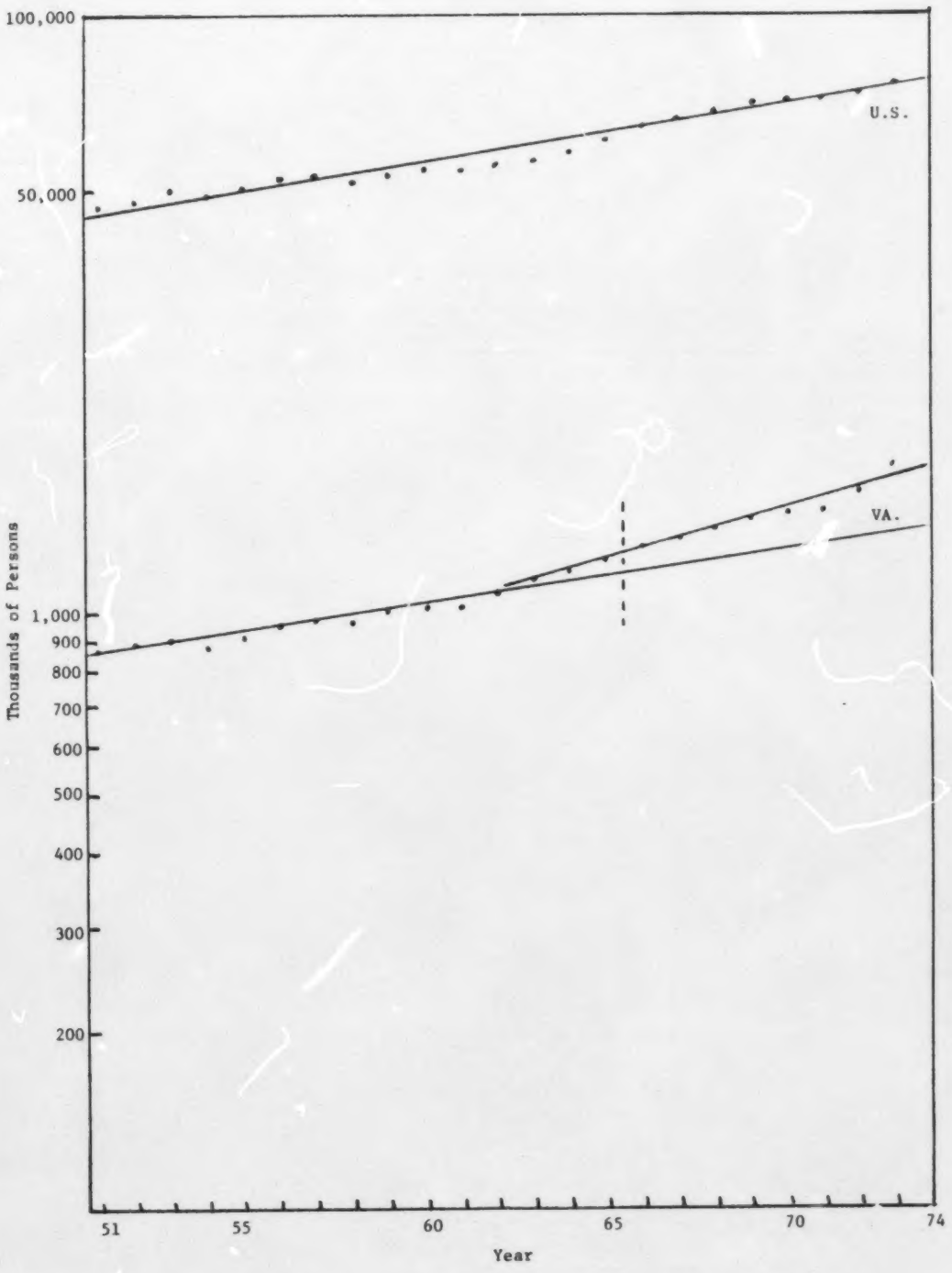


Figure 4-9. Employment in Non-Agricultural Establishment

Personal Income by Place of Work. Personal income by place of work was analyzed to correlate the information presented on personal income. Because personal income showed a growth rate greater than the national average, its components were analyzed to ascertain which factors demonstrated the greatest effect.

The information is presented in Appendix F and Figures 4-10, 4-11, and 4-12. Wage and salary income grew 347.5% for Virginia and 292.2% for the United States. Virginia's other labor income grew 1,034.[illegible]% during the period from 1954 to 1974, whereas the United States income for the period grew 726.8%. Proprietors' income increased 129.7% in Virginia and 123.8% in the entire United States.

Virginia's growth rate in these three sources of personal income grew at a faster rate after 1966 than before that date. The greatest change in the growth occurred in proprietors' income, followed by wage and salary income. Other labor income, although it showed the greatest percentage increase, showed the smallest increase in growth rate.

Summary

The rate of change in the economic indicators selected for analysis here increased since 1966. The factors showed a greater rate of growth than that prior to 1966 and a greater rate of growth than the national averages.

Table XXV is a summary of the performances of the selected indicators. As can be seen, Virginia's increases were consistently greater than the national increases after 1966. In those cases

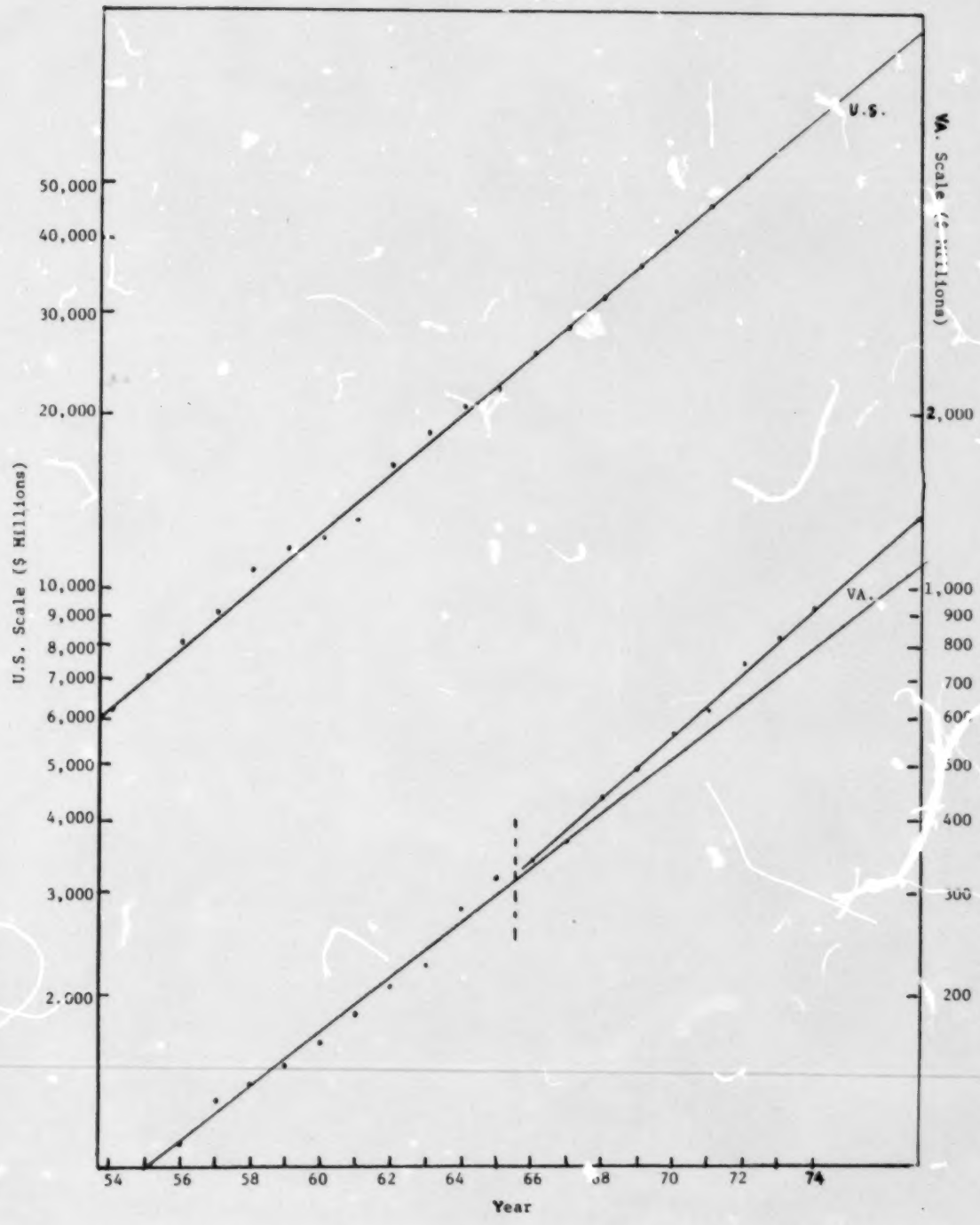


Figure 4-10. Personal Income by Place of Work--Other Labor Income

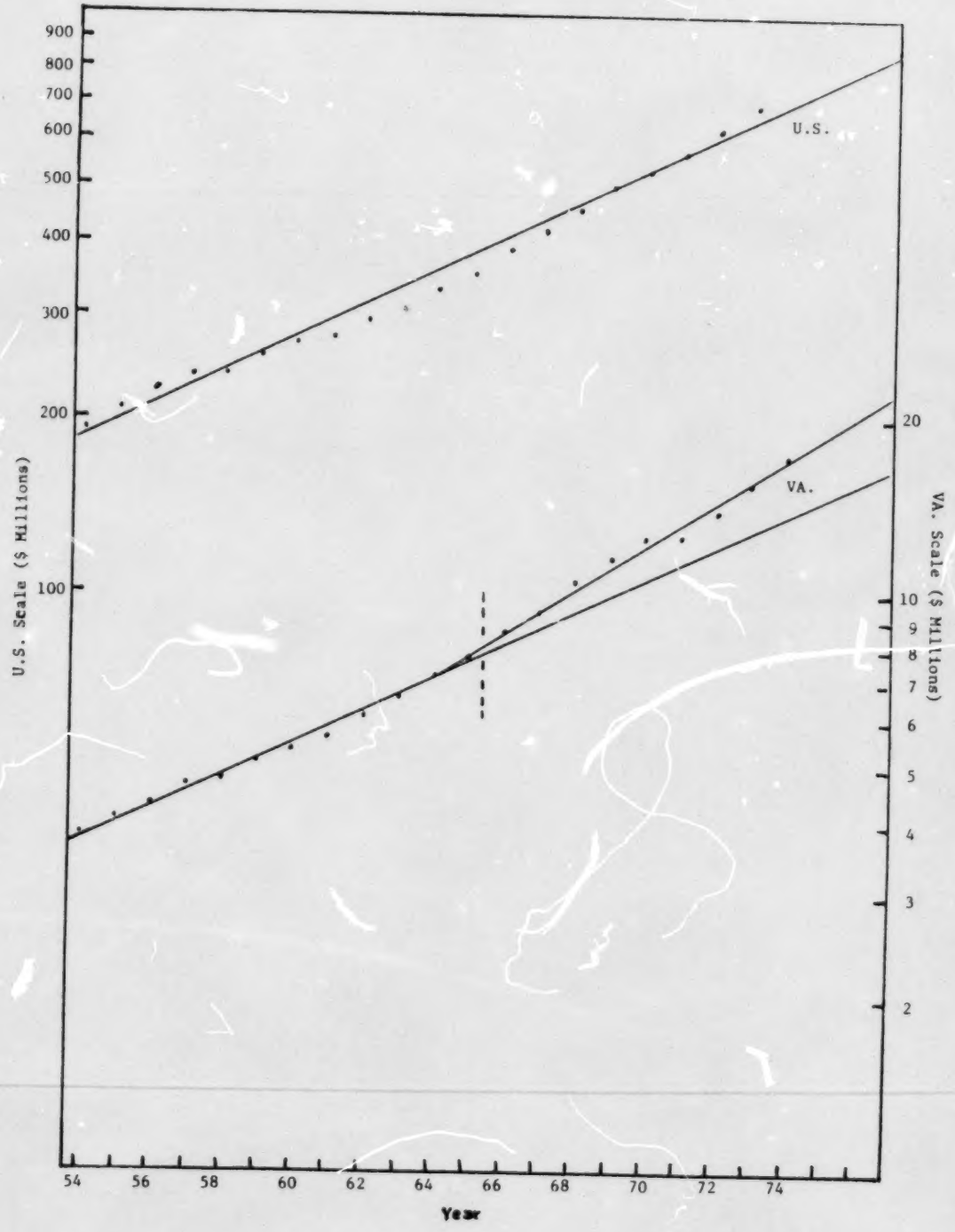


Figure 4-11. Personal Income by Place of Work--Wage & Salary

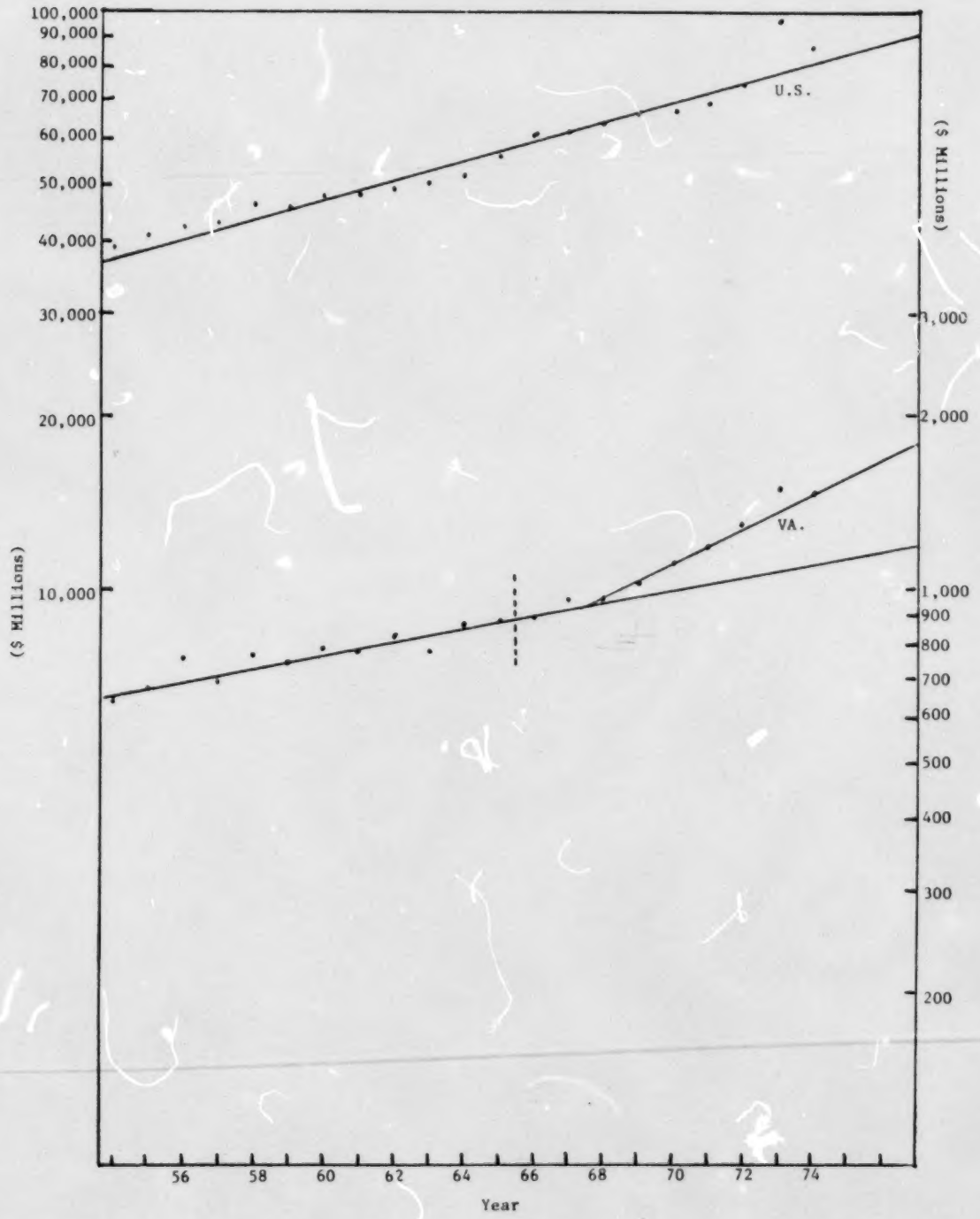


Figure 4-12. Personal Income by Place of Work--Proprietors Income

TABLE XXV

CHANGE IN SELECTED ECONOMIC INDICATORS

Indicators	Change			
	Virginia		United States	
	Base Year to 1966	1966 to 1974	Base Year to 1966	1966 to 1974
Average Weekly Earnings	60%	60.2%	59.4%	56.7%
Average Hourly Earnings	53.5%	67.4%	52.8%	61.8%
Average Weekly Hours	+1.7 hrs	-1.8 hrs	+1.7 hrs	-1.3 hrs
Personal Income	149.0%	121.0%	131.7%	96.3%
Per Capita Income	91.8%	100.6%	81.6%	81.5%
Non-Agricultural Employment	46.0%	39.5%	30.1%	22.5%

where there was a decrease, Virginia's was generally less than the national decrease.

Average weekly earnings increased 60.2% after 1966, as compared to 60% prior to that time. The national average only increased 56.7% after 1966, as compared to a 59.4% change prior to that time. Average hourly earnings increased 67.4% from 1966 to 1974 in Virginia compared to a national increase of 61.8%. Prior to 1966, Virginia had increased 53.5% and the national average increased 52.8%. Virginia has shown a greater decrease in the average weekly hours, 1.8 hours, than the national average, 1.3 hours.

Personal income in Virginia increased 149% before 1966 and 121% after 1966. The national personal income grew 131.7% before 1966 and 96.3% after that date. Per capita income in Virginia increased 91.8% prior to 1966 and 100.6% after that date. For the nation there was a drop from an 81.6% increase prior to 1966 to an 81.5% increase after that date.

Virginia's increase in non-agricultural employment stayed above the national change. Before 1966 non-agricultural employment increased 39.5% for Virginia as compared to 30.1% for the nation. After 1966 Virginia increased 39.5% whereas the nation increased 22.5%.

Chapter 5

CONCLUSIONS

Introduction

The purpose of this study was twofold: (1) to measure the economic impact of the Virginia Community College System on the state's business volume, employment, and income since 1966, and (2) to determine if there had been a substantial change in the economic growth of Virginia in relationship to past trends and national trends since the advent of the community college system.

The hypotheses that were tested in this study were: (1) that the Virginia Community College System had had a signficant impact on the economic health of Virginia as measured by a modified Caffrey economic impact model, and (2) that the state's economic health, as measured by selected indicators, had improved since the advent of the community colleges.

In 1966 Virginia had recognized and accepted the need for broadened access to higher education. Since that time the state's enrollment in higher education grew 213%, with community colleges accounting for 57.2% of the college population by 1974. This tremendous enrollment increase reflected the widespread acceptance of education as an economic growth contributor as well as an important factor both in social change and in stability.

The development and growth of the community colleges was a reflection of two factors. First, there was a national surge in the

sixties to develop community colleges. Second, Virginia's leaders felt that an expansion of curriculums and educational facilities was necessary to promote continued economic growth.

With this background, this study investigated the economic impact of the community colleges and the economic changes that occured in the state since 1966.

Economic Impact

The results of this study support the findings of Caffrey/Isaacs et al that educational institutions have a major economic impact on their communities. The precursors of this study demonstrated that higher education institutions give more to their communities than they take. This holds true, as this study demonstrated, even when a state is considered as a community.

Expenditures of the Virginia Community College System created from $10,440,205 to $99,976,972 in business volume from 1966-67 through 1973-74, or approximately twice the state general fund appropriations for the community college system, which ranged from $3,287,897 to $40,833,150. The total amount of general fund appropriations for this period of time was $156,425,679. The total business volume generated by monies related to the presence of the community colleges as $377,909,914, or 242%. This impact ranged a low of 189% of the appropriations in 1968-69 to a high of 318% in 1966-67.

The business volume generated by community college expenditures resulting from outside sources of funding such as federal

grants totaled $146,522,464, slightly less than one-half of the total volume generated. The conclusion drawn from these figures is that the presence of the community colleges had a significant impact on the business volume of the state. And even when the effect of only the new monies was considered, the impact was almost equal to the total state fund appropriation.

The direct employment of the Virginia Community College system grew from 341 full-time equivalents in 1966 to 3,820 full-time equivalents in 1974. The total direct and indirect employment grew from 783 man-year jobs to 7,498 man-year jobs during the same period. Indirect employment is that employment arising from community college related expenditures and is determined by multiplying business volume by .00009, the employment requirements coefficient, as described in the previous chapter. The employment generated by the new monies grew from 366 man-years in 1966 to 3,769 man-years in 1974. The conclusion drawn from this set of figures is that the community colleges have made a substantial contribution to the state's employment in relation to the direct employment of the system.

Personal income generated by community college related monies was 292% of the average appropriations for the community colleges over the eight years studied. This means that state income increased almost three fold over the support appropriations for community colleges.

A positive relationship remained when adjustment was made for only the new monies attracted into the state. The income generated by new monies averaged 116% of the state general fund appropriation since 1966.

These factors lead us to the conclusion that the state has seen an increase in its individual income in excess of appropriations made to support the community colleges.

The community colleges are returning as much or more to the state as they draw from the state budget in terms of the business volume, employment, and income impacts. Even when adjustment was made for new monies attracted into the state, the relationship remained favorable. Business volume was 93.7% of state appropriation, new employment was 77% of the total college employment, and income was 116% of state appropriations. When total money is considered, the figures were significantly higher. However, considering that there is an exchange aspect when analyzing total monies, the impact of the new monies was the more important and relevant consideration.

Economic Indicator Trend Analysis

The analysis of economic trend data partially supports the hypothesis that the Virginia economy had improved subsequent to the advent of the community college system. This fact was most dramatically illustrated by the personal income and per capita personal income analysis. As was established in the review of literature, the more educated a person is, the greater his earning potential tends to be. Also, more advanced and developed economies

tend to have higher levels of education than do the less developed economies.

The inauguration of the community college system is only one factor which contributed to the economic growth of the state. Certainly another important factor has been the growth of the industrial sector of the economy which has paralleled the development of the community colleges, as reflected in the trend of non-agricultural employment. It was not determined whether the inauguration of the community colleges initiated industrial development, or whether industrial development encouraged the development of the community colleges, or whether they grew together, each feeding and encouraging the other. This type of causal relationship was beyond this study. However the upturn in the state's economy occurred earlier than the author expected it would. It was initially expected that there would be a two year lag between the development of the community colleges and a change in the growth rate of the state. Since the community colleges did not get fully developed until 1969, it was expected that the upturn in the state's economy would have occurred around 1971. However the indicators demonstrated an upturn as early as 1966. Therefore this study supports Machlup's contention that the demand for education increases as the national income increases, as was mentioned earlier.

The findings of this study also substantiate the work of Schultz, Becker and Denison by showing changes in economic growth patterns which correspond to changes in levels of education.

Beginning in 1965 and accelerating since that time, the rate of growth in personal income and per capita personal income had increased at a greater rate than had the national average. The rate of change in these factors was greater after 1966 than prior to that time, and the rate of growth has been greater than the rate of growth for the national average. As a secondary check on this growth, the Virginia per capita income as a percentage of the United States average was compared to the surrounding regions, the Southeast and the Mideast. Virginia's percentage had been consistently above the Southeast average and led it on a continuing upward trend, however, the Mideast showed a slightly downward trend. It should also be emphasized that the Virginia average had almost reached the national average by 1974 (99.1% of it). Virginia's performance has outpaced the surrounding regions.

The rate of change in non-agricultural employment was greater than the rate of change prior to 1966, and Virginia's rate of change after 1966 was greater than the national rate of change. Virginia had made rapid movement toward a non-agricultural economy. Other studies have demonstrated that a movement of this type is a characteristic of economic growth.

The average weekly earnings for manufacturing production workers increased 60% in Virginia as compared to a 56% increase in the United States from 1966 to 1974. The performance of the hourly earnings figure showed a similar performance. At the same time the

average hours worked showed a tendency to drop below the national average in recent years. This had not happened prior to 1969 in the period covered by this study. Since this indicator shows the changing employment of workers between relatively high-paid and low-paid work and the high and low wage industries, it may be concluded that Virginia's manufacturing production workers are moving into higher paid jobs in higher wage industries, thus reflecting a change in the complexion of Virginia's industries.

Virginia had a characteristically lower unemployment rate than the United States. Between 1954 and 1966 the average difference between these rates was 1.65%. Virginia's trend also tended to follow the United State's trend. However, since 1966 the average variation between the rates narrowed to 1.34%. It would appear that as Virginia moves in the direction of a more industrialized economy, its unemployment rate will continue to edge closer to the rate for the nation.

In combining the implications of the changes in the selected indicators,it was concluded that the economy of Virginia underwent an increase in its rate of growth since 1966. This rate of growth had been greater than the growth rate prior to 1966 and had been greater than the growth of the United States. Although this change occurred primarily since 1966, no causal links were drawn. It is not known whether education leads to economic growth or whether economic growth causes an increase in the demand for education. However, this study has shown that there has been an increase in the growth rate in Virginia since the founding of the Virginia Community

College System in 1966.

Recommendations for Further Study

The following are recommendations for further study which have arisen from this study.

(1) The assumptions of the economic impact model require further testing.

(2) Social impacts should be studied to ascertain if they show the same types of change as economic impacts.

(3) Further analysis should be done on trend behavior utilizing more economic indicators.

(4) There should be further investigation of the complexion of the industrial mix in Virginia. This could be combined with a comparison of the composition of the labor force to ascertain whether there has been a change in the sophistication of the work performed.

(5) Further checks need to be made on per capita income growth, and income distribution, especially in relation to population migration.

(6) An analysis should be made to ascertain if the same types of changes have occurred in the state's community college districts as have occurred across the state.

(7) Further investigation of the trend in unemployment and unemployment rates should be made especially in relation to the surrounding states.

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APPENDICES

APPENDIX A

Table XXVI. Wage and Hour Data - Production Workers Manufacturing for Virginia and the U.S.

Year	Average Weekly Earnings		Average Weekly Hours		Average Hourly Earnings	
	U.S.	Va.	U.S.	Va.	U.S.	Va.
1974	176.00	145.25	40.0	39.8	4.40	3.65
1973	165.65	135.60	40.7	40.6	4.07	3.34
1972	154.69	126.48	40.6	40.8	3.81	3.10
1971	142.44	115.78	39.9	40.2	3.57	2.88
1970	133.73	109.20	39.8	40.0	3.36	2.73
1969	126.51	106.60	40.6	41.0	3.19	2.60
1968	122.51	101.11	40.7	41.1	3.01	2.46
1967	114.90	93.43	40.6	40.8	2.83	2.29
1966	112.34	90.69	41.3	41.6	2.72	2.18
1965	107.53	87.56	41.2	41.5	2.61	2.11
1964	102.97	83.84	40.7	41.1	2.53	2.04
1963	99.63	80.16	40.5	40.9	2.46	1.96
1962	96.56	78.31	40.4	41.1	2.39	1.91
1961	92.34	74.56	39.8	40.3	2.32	1.85
1960	89.72	70.62	39.7	39.9	2.26	1.77
1959	88.26	69.02	40.3	40.6	2.19	1.70
1958	82.71	65.50	39.2	39.7	2.11	1.65
1957	81.59	64.40	39.8	40.0	2.05	1.61
1956	78.78	61.80	40.4	40.4	1.95	1.53
1955	75.70	59.30	40.7	40.9	1.86	1.45
1954	70.49	56.66	39.6	39.9	1.78	1.42

Source: Handbook of Labor Statistics

APPENDIX B

Table XXVII. Unemployment Rates for Virginia and the United States

Year	U.S.	Va.
1974	5.6	4.58
1973	4.9	3.57
1972	5.6	3.63
1971	5.9	3.91
1970	4.9	3.17
1969	3.5	2.70
1968	3.6	2.71
1967	3.8	2.84
1966	3.8	2.72
1965	4.6	3.02
1964	5.2	3.30
1963	5.7	3.60
1962	5.6	3.80
1961	6.7	4.60
1960	5.6	4.20
1959	5.5	5.20
1958	6.8	5.20

Source: Virginia Economic Indicators and Statistical Abstract of the United States

APPENDIX C

Table XXVIII. Personal Income and Per Capita Income for Virginia and the United States

Year	Personal Income ($ millions)		Per Capita Income		Virginia as % of U.S.
	U.S.	Va.	U.S.	Va.	
1974	1,151,622	26,205	$5,448	$5,339	99.1%
1973	1,054,081	23,610	5,023	4,874	97.0
1972	944,595	20,964	4,537	4,400	97.0
1971	864,989	18,863	4,195	4,001	95.4
1970	798,949	17,294	3,966	3,712	93.6
1969	751,425	15,733	3,733	3,419	91.6
1968	688,978	14,383	3,457	3,156	91.3
1967	629,204	12,983	3,188	2,880	90.3
1966	586,736	11,859	3,001	2,661	88.7
1965	538,690	10,870	2,785	2,464	88.5
1964	497,268	10,029	2,603	2,302	88.4
1963	465,234	9,009	2,469	2,128	86.2
1962	442,078	8,537	2,381	2,042	85.8
1961	415,984	7,868	2,274	1,921	84.5
1960	399,947	7,426	2,222	1,863	83.8
1959	381,890	7,136	2,166	1,806	83.4
1958	358,252	6,680	2,067	1,707	82.6
1957	348,460	6,349	2,045	1,652	80.8
1956	330,479	6,084	1,975	1,634	82.7
1955	308,265	5,638	1,876	1,571	83.7
1954	287,607	5,338	1,785	1,501	84.1
1953	285,458	5,292	1,804	1,488	82.5
1952	269,769	5,150	1,733	1,470	84.8
1951	253,233	4,763	1,652	1,387	83.9

Source: Survey of Current Business

APPENDIX D

Table XXIX. Comparison of Regional and United States Per Capita Incomes

Year	Southeast		Mideast	
	Per Capita Income	Percent of U.S.	Per Capita Income	Percent of U.S.
1974	$4,696	86.2%	$5,973	109.6%
1972	3,859	85.0	5,044	111.2
1970	3,257	82.1	4,471	112.7
1968	2,761	79.9	3,901	112.8
1966	2,287	76.2	3,325	110.8
1964	1,951	75.1	2,958	113.6
1962	1,747	73.4	2,728	114.6
1960	1,610	72.4	2,565	115.4
1958	1,507	72.9	2,384	115.3
1956	1,423	72.0	2,283	115.6
1954	1,256	66.9	2,054	115.1
1952	1,213	70.0	1,985	114.5

Source: Survey of Current Business

APPENDIX E

Table XXX. Employment in Non-Agricultural Establishment

Year	United States (thousands)	Virginia (thousands)
1974	78,334	1,792.7
1973	76,833	1,747.4
1972	73,714	1,643.5
1971	71,222	1,558.0[1]
1970	70,920	1,519.6
1969	70,442	1,438.1
1968	67,951	1,385.4
1967	65,857	1,330.2
1966	63,955	1,285.3
1965	60,815	1,218.8
1964	58,331	1,163.0
1963	56,702	1,123.8
1962	55,596	1,081.8
1961	54,042	1,034.8
1960	54,234	1,017.6
1959	53,313	1,000.5
1958	51,363	967.2
1957	52,894	972.0
1956	52,408	955.5
1955	50,675	912.0
1954	49,022	880.2

Source: Handbook of Labor Statistics

[1]Not strictly comparable with previous years because of change in data base (1970 - 1974)

APPENDIX F

Table XXXI. Personal Income by Place of Work for Virginia and the United States

Year	Wage and Salary		Other Labor Income		Proprietors' Income	
	U.S. ($ millions)	Va. ($ millions)	U.S. ($ millions)	Va. ($ millions)	U.S. ($ millions)	Va. ($ millions)
1974	757,289	17,257	51,378	930	87,654	1,475
1973	694,423	15,570	45,926	828	96,089	1,501
1972	628,926	13,851	41,721	744	75,859	1,307
1971	572,917	12,515	36,361	621	69,179	1,192
1970	537,178	12,425	32,149	564	66,919	1,107
1969	505,204	11,458	28,415	485	67,191	1,033
1968	460,680	10,420	25,357	437	64,214	963
1967	419,309	9,359	22,178	371	62,147	962
1966	391,083	8,590	20,702	343	61,299	888
1965	355,915	7,819	18,734	317	56,682	883
1964	331,108	7,222	16,618	283	52,315	865
1963	309,721	6,620	13,098	224	50,638	774
1962	294,695	6,140	12,299	207	49,822	830
1961	276,417	5,652	11,587	184	48,220	777
1960	269,118	5,400	10,891	165	48,163	790
1959	255,855	5,174	10,294	151	46,333	745
1958	236,671	4,779	9,310	139	46,555	776
1957	235,866	4,690	9,144	130	44,483	694
1956	225,070	4,454	8,102	111	43,715	767
1955	208,039	4,104	7,136	93	41,821	679
1954	193,089	3,856	6,214	82	39,164	642

Source: Survey of Current Business

THE ECONOMIC IMPACT

OF THE VIRGINIA COMMUNITY COLLEGE SYSTEM

FROM 1966 TO 1974

by

Norval L. Wellsfry

(ABSTRACT)

Community and state support for higher education is based on the assumption that education is a significant factor in economic change. Economic growth is an expected return of educational investment. Virginia's investment in higher education increased almost 200% between 1963-64 and 1973-74, with the community colleges accounting for a significant proportion of the increase.

The purpose of the study was to measure the economic impact of the community colleges on the State's business volume, employment, and income since 1966 and to analyze the trends in selected economic indicators to analyze the degree of change in those factors since 1966 and to compare this trend to previously established trends in Virginia and the United States.

The economic impact of the community colleges on Virginia was measured using a model based on that originally devised by Caffrey and Isaacs. The impacts were measured, business volume, employment, and individual income. These impacts were further divided into impacts of the total expenditures related to the presence of the community colleges and to the expenditures related only to the new

money attracted into the state through the community college presence.

The trend analysis of selected economic indicators evaluated the relative changes in the performance of the Virginia economic system since the advent of the community colleges. The indicators used in the study were wage and hour data, unemployment, personal and per capita personal income, non-agricultural employment, and personal income by place of work.

The expenditures of the Virginia Community Colleges had a significant impact on the state's economy. Between 1966 and 1974, the state general fund appropriation totaled $156,424,000. During this same period, business volume of $278,030,000 was generated by total monies and $146,521,000 by new monies. By 1974, 11,318 jobs related to total monies and 3,769 jobs were related to the new monies. A total of $491,648,000 in individual income was generated by total monies and $187,661,000 by new monies.

The economic trend analysis partially supported the hypothesis that the Virginia economic system improved subsequent to the advent of the community colleges. Personal income, per capita income and non-agricultural employment showed particular change in their growth rates after 1966, both in relation to previously established state trends and national trends.

In conclusion, the Virginia Community College System's expenditures have made a contribution to the Virginia economy and the state's economy has shown an increase in its rate of growth since the 1966 advent of the community colleges, although factors other than the community colleges have probably contributed to this growth.

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